FOOD MANUFACTURE

Incorporating Food Industries Weekly

A PUBLICATION OF THE LEONARD HILL TECHNICAL GROUP 339 SEPTEMBER 1, 1958

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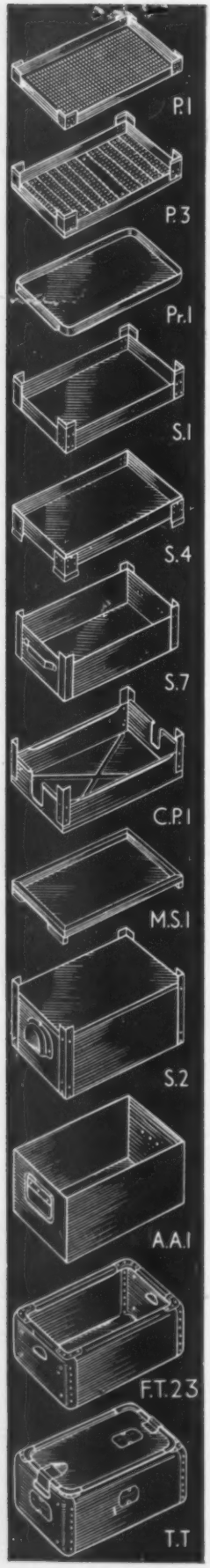

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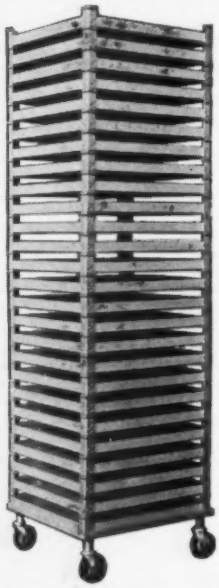
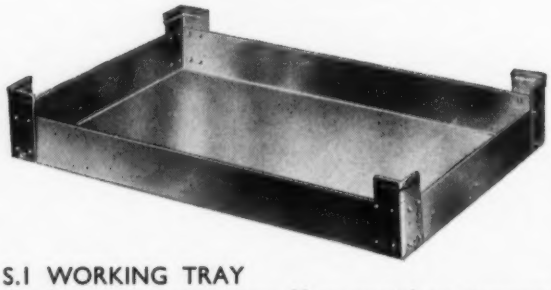


We illustrate above the stacking principle which can be made mobile in conjunction with a "HESTALITE" Trolley.



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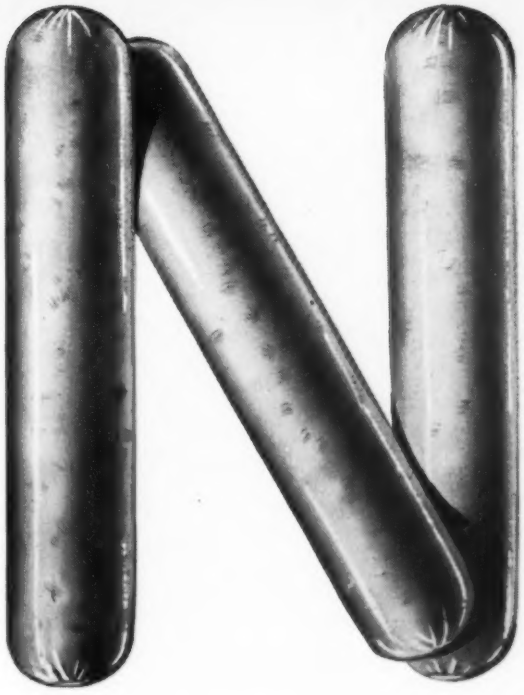

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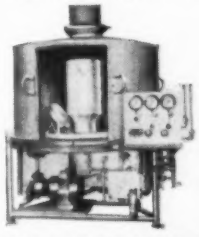

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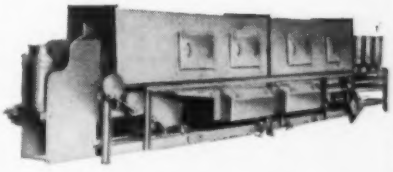

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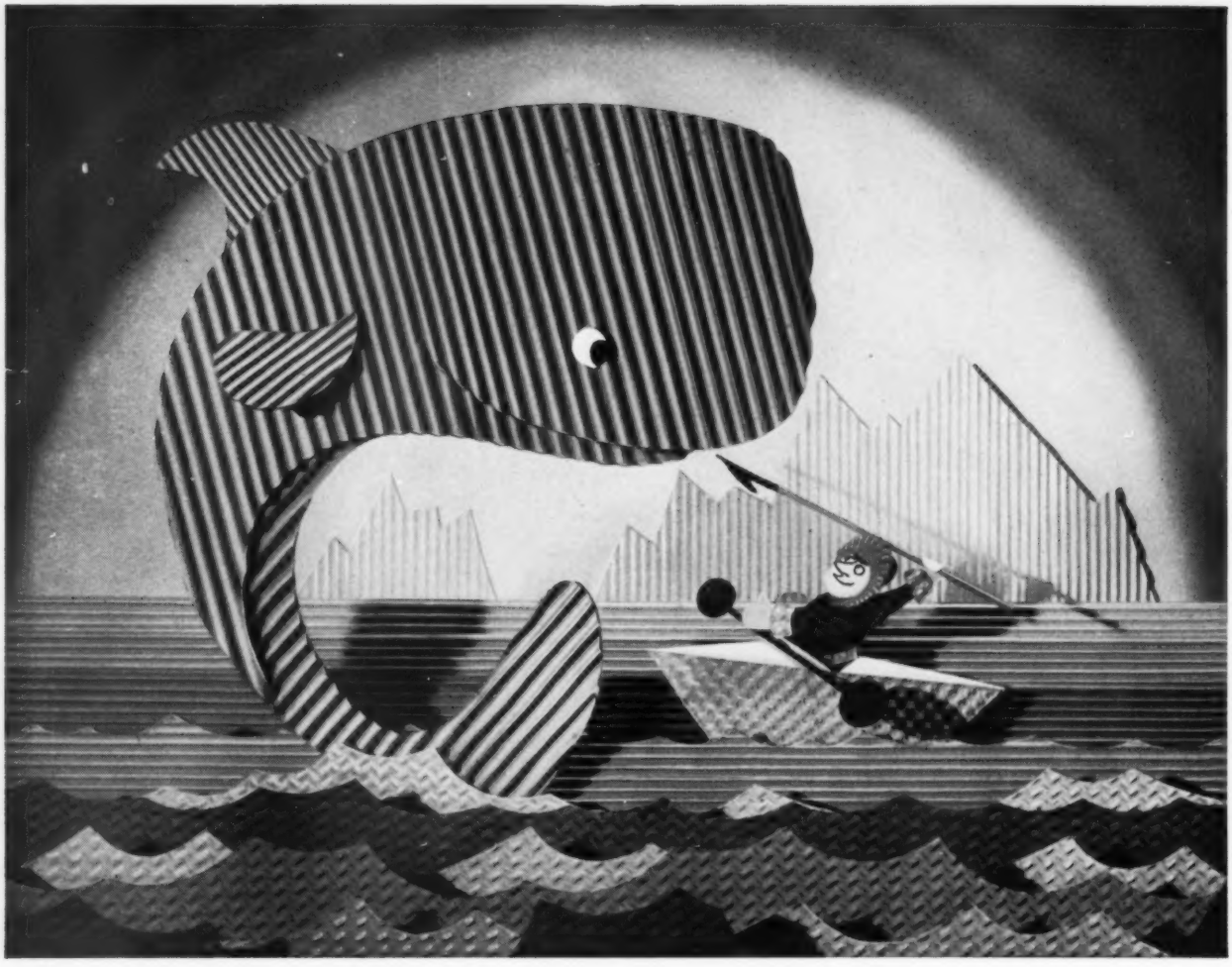

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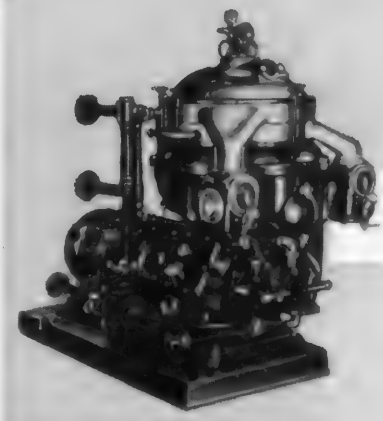

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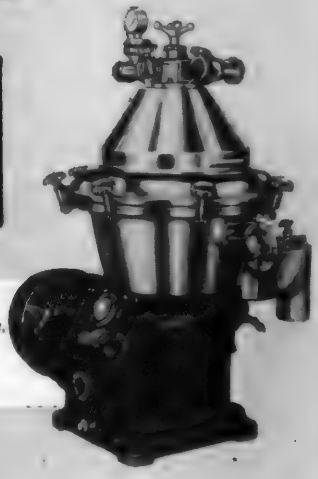

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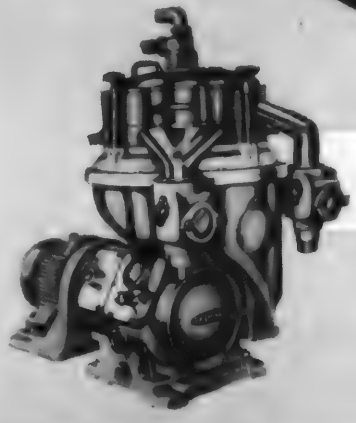

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Smee's DL 395

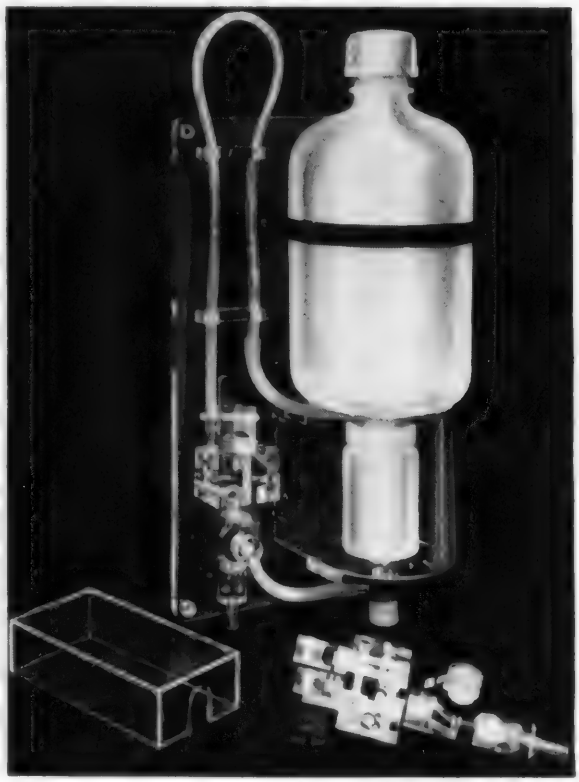
Precision machined 'Perspex' used in Condesco drip regulators

'PERSPEX' acrylic sheet is clean, hygienic, transparent and corrosion resistant. *Above all, it is outstanding for the accuracy with which it can be precision machined.*

For these reasons it was chosen in the making of Condesco drip regulators, the purpose of which is to dispense all types of liquid, either alkali or acid, in droplet form. They are specially suitable for use on bottle and churn washing plant in dairies and breweries. The many parts of this unit made from 'Perspex' required very accurate machining and, because this sort of unit is so often used in connection with food, had to be completely hygienic. The bottles are made from I.C.I. 'Alkathene' which is also inert and hygienic.

More and more 'Perspex' is being used in applications where precision machining is necessary. In addition to those features already mentioned, 'Perspex' is light, shatter-proof and long lasting. It is a good electrical and thermal insulator, too. 'Perspex' is available in a variety of very attractive transparent, translucent and opaque colours as well as in clear and opal sheet.

The illustration shows 'Perspex' components made by R. O. Harris & Co. Ltd., London, for the Drip Regulator designed by Condesco Products Ltd.



·PERSPEX·

'Perspex' is the registered trade mark for the acrylic sheet manufactured by I.C.I.

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ICI

A word or two on illumination

A switch is pressed in the home . . . night shifts of Industry concentrate on intricate problems . . . across the globe hundreds of thousands of fans roar at floodlit soccer matches . . . ports and dockyards work on throughout the night. In these, and countless other ways, Benjamin Lighting Fittings are efficiently and reliably carrying out their tasks all over the world.

For 50 years The Benjamin Electric Ltd., one of the world's largest manufacturers of lighting fittings, have met the lighting needs of Industry, Commerce, Business and Sport with scientifically designed fittings. When you consult Benjamin, this wealth of experience, knowledge and technical ability is at your disposal.

GOLDEN JUBILEE BENJAMIN 1908 · 1958

better lighting by BENJAMIN REGD.

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the bitter 'bite' of yeast with

Super Grade YEATEX

Using a new de-bittering process, we have eliminated the bitter, yeasty bite from yeast extract whilst retaining its nutritional value and vitamins of the B Complex in their correct balance. *Super Grade* Yeatex—as we have very properly called this improved extract—has a delicate aroma and flavour and is smooth and irresistible to the taste. By adding a subtle piquancy to many products it dispenses with synthetic flavourings. The finest yeast extract obtainable, *Super Grade* Yeatex has a place in many foods. Has it one in yours? We'll be happy to advise you.

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THAMES Traders!

with 4 and 6 CYLINDER DIESEL AND PETROL ENGINES

They will tell you that these advantages put the

*NEW THAMES '5-STAR' RANGE

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● COMPLETELY FORWARD CONTROL — extra loadspace . . . extra earning capacity . . . stronger, tougher, longer-lasting, more manoeuvrable . . . ALL FOR *LESS* OVERALL LENGTH!

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● THE BEST EVER DIESEL OR PETROL OPTION is now yours with the new Thames Traders:—

4-Cylinder Diesel Engine OR **4-Cylinder Petrol Engine**	*for 30 cwt. 2, 3, 4 and 5 ton trucks*
***NEW* 6-Cylinder Diesel Engine** OR ***NEW* 6-Cylinder Petrol Engine**	*for 4, 5 and 7 ton trucks 4½, 5 and 6 cu. yd. Tippers*

● PLUS an extensive range of optional factory-fitted equipment . . .

and FORD SERVICE, too!

SEE YOUR DEALER FOR FULL DETAILS AND PRICES

They're FORD Winners!

*The introduction of Thames Forward Control Traders does not affect availability of Thames semi-forward control trucks. This established range of vehicles (up to 4 tonners with 4-cyl. Petrol and Diesel alternatives) is still in full production and available from your Dealer.

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control them with PYBUTHRIN Insecticides

Without the protection of a "Pybuthrin" insecticide, stored food products can be an easy target for insect pests. Millions of pounds worth of damage annually is caused by infestations in stores, warehouses, mills, factories, granaries, and any other building where food is either processed or stored. "Pybuthrin", containing African pyrethrum synergised with piperonyl butoxide, is the basis of a range of Cooper insecticides which are deadly to various types of food pests but non-poisonous and completely safe in use. If you have any kind of insect problem in your premises, consult COOPER'S. Write for free advice and full details of "Pybuthrin" insecticides!

It's death to the Flour Beetle

Infestations of the Confused Flour Beetle (Tribolium confusum) can be controlled by routine spraying of store-room walls and commodities with "Pybuthrin" Insecticide No. 44. One gallon is sufficient for 1-2000 sq. ft., the frequency of treatment varying according to local conditions.

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• A COOPER PRODUCT

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First find your fire . . .

. . . and your power and light switches and your dangerous live wires. But how—when a factory is filled with smoke and heat that can kill a man in one breath . . . ?

Ask any Fire Chief. He will tell you: the rapid removal of smoke and heat is the key to fire fighting. It enables him to get at and put out the fire before it can spread—and with the least smoke and water damage.

Colt Dual-Purpose Fire Ventilators not only provide an automatic means of removing smoke, heat and flames, but also give excellent day-to-day working conditions. Hence their widespread adoption by industry.

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- **SMOOTH AND QUIET IN OPERATION.**
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Floor area required less than one twentieth that of a ball mill having comparable output. Total volume of grinding chamber is available as working volume. Directly driven by built-in electric motor with simple direct starter, no exposed moving parts and no guarding. *Facilities are available for grinding trials to be carried out on submitted samples by the Research and Development Section of W. Podmore & Sons Ltd.*

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and through it pass
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FORSTER'S
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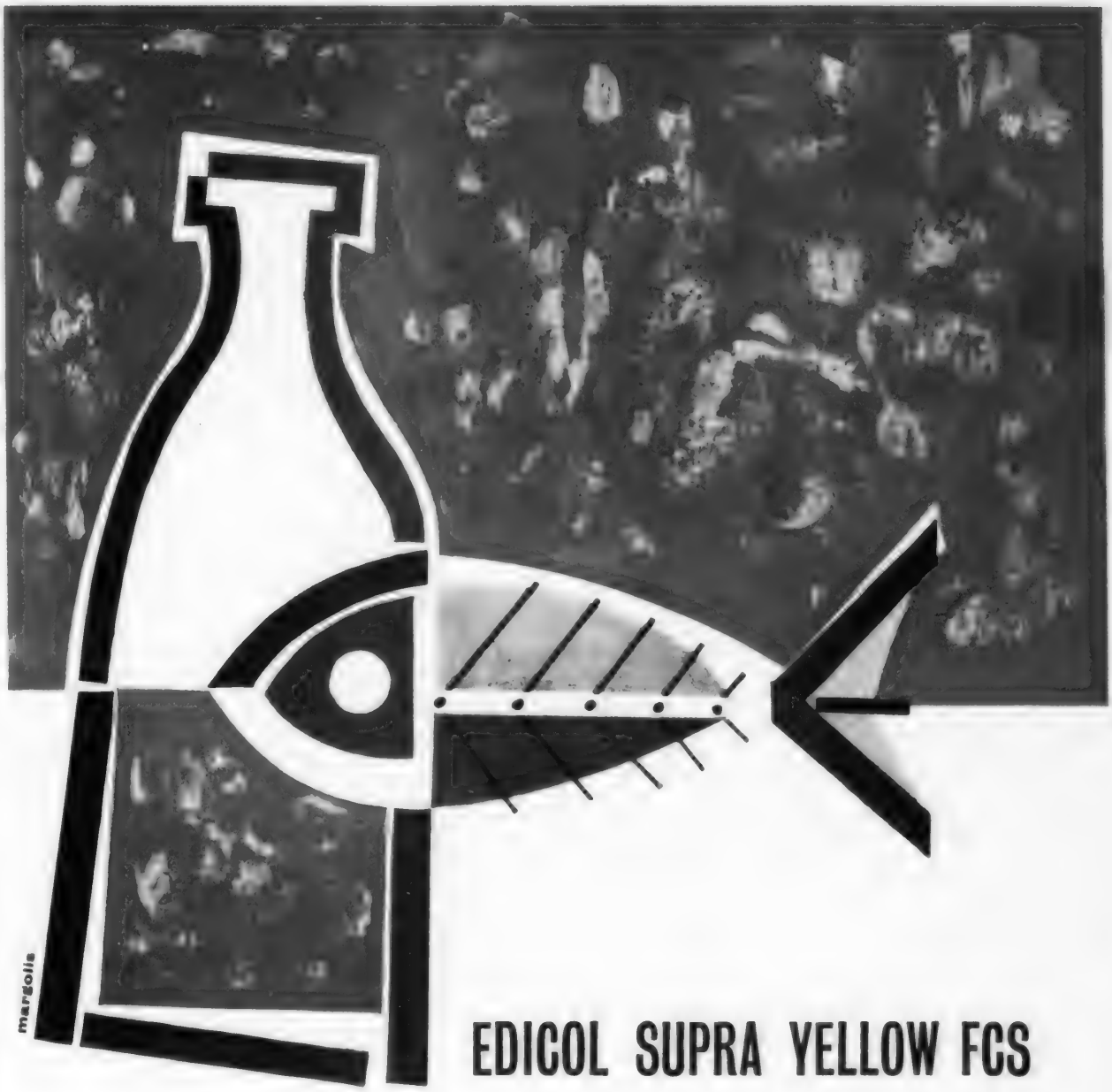

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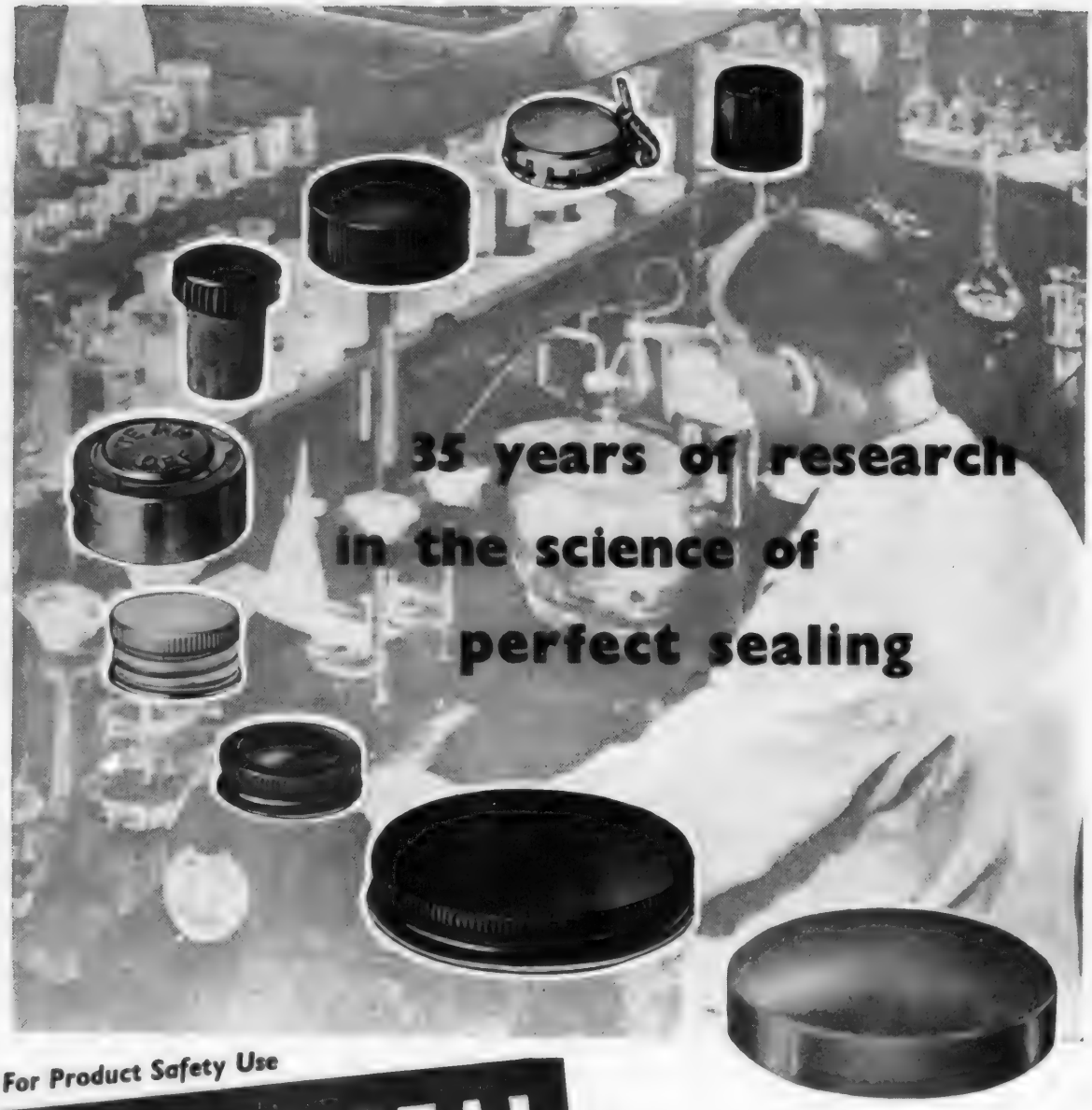

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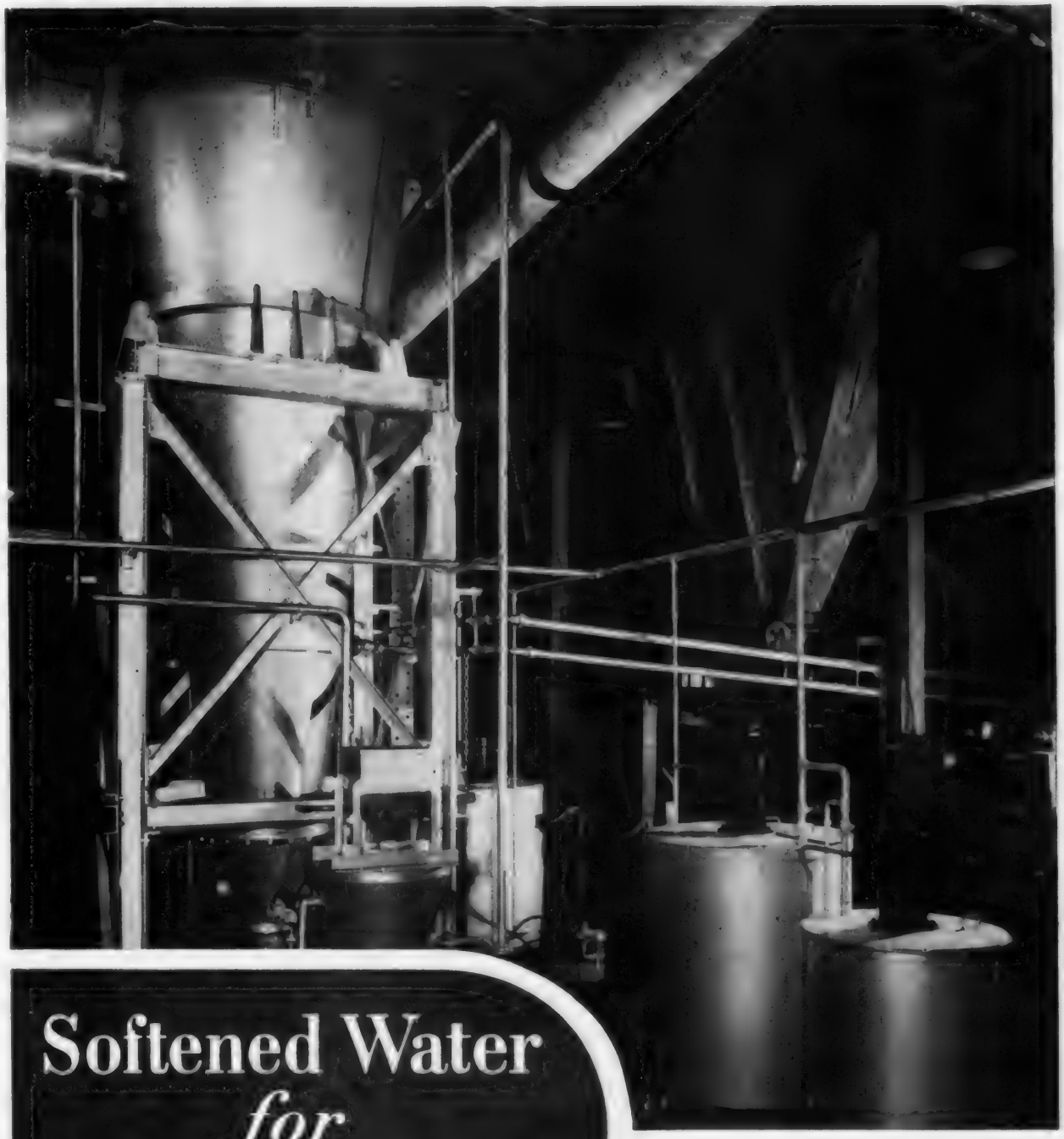

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Help yourself *and* the housewife by choosing an attractive, hermetic R.O. Seal for your pack. Automatically applied, the R.O. Seal protects and preserves your product until it reaches the ultimate consumer.

tailor made to fit individual bottles and jars.

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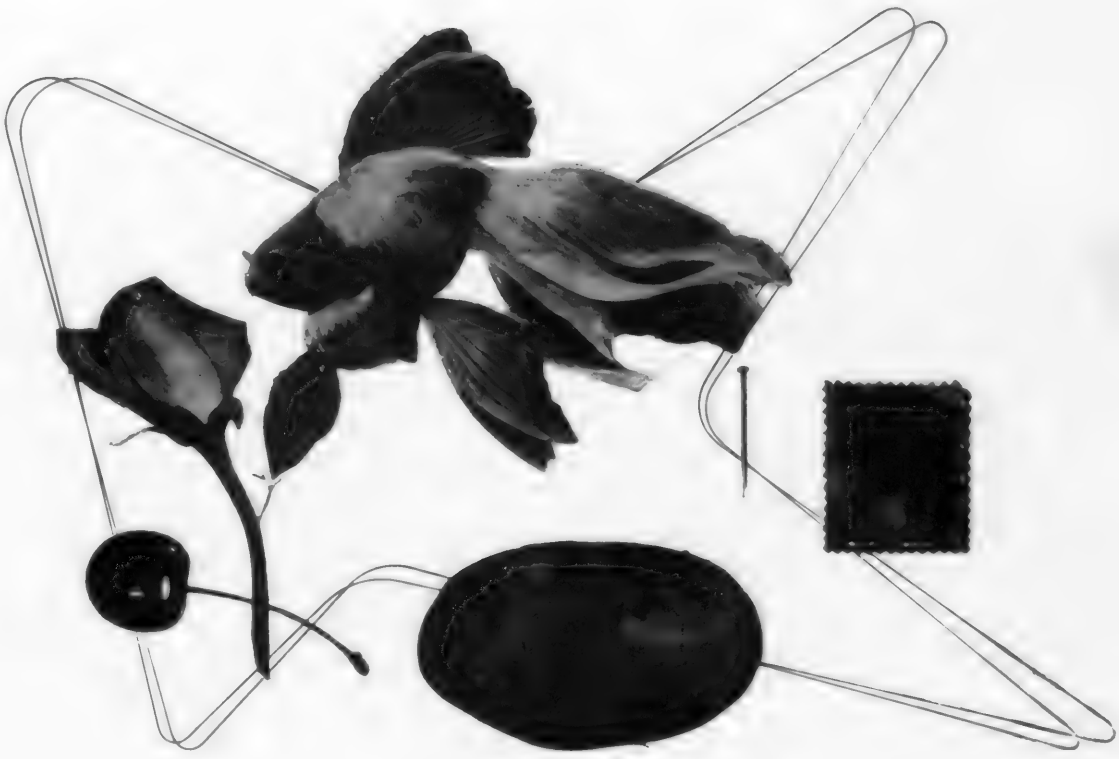

THIS, THAT AND THE OTHER...

. . . transparent packaging films play a unique role in protecting and "moving" merchandise of every description. The variety is almost infinite.

So, too, is the variety of films. As the largest manufacturers of cellulose film in Europe and the Commonwealth and makers of the famous "Cellophane" film, as makers of B.C.L. polythene film and sole agents for Courtaulds' cellulose acetate film, we are proud of our ability to supply films in types and gauges to suit every product.

Our scientists, top men in their field, in constant touch with the world's merchandising problems and solutions, work continuously to produce new and improved films such as MXXT-type "Cellophane" (the most moistureproof packaging film in the world), polythene-coated "Cellophane" and special films for wrapping fresh meat, fruit and vegetables, and quick-frozen foods, for instance.

Colodense Ltd., an associated company, has an international reputation as high-quality colour-printers and converters of transparent films.

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Whatever your product, we have the best film for it. Whatever your packaging problem, we shall be delighted to help you, without obligation. Why not get in touch with us today?

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"Cellophane" is the registered trade mark of British Cellophane Limited and denotes the brand of cellulose film manufactured by them.

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or steel drum -

Reads' printing is of the same high quality

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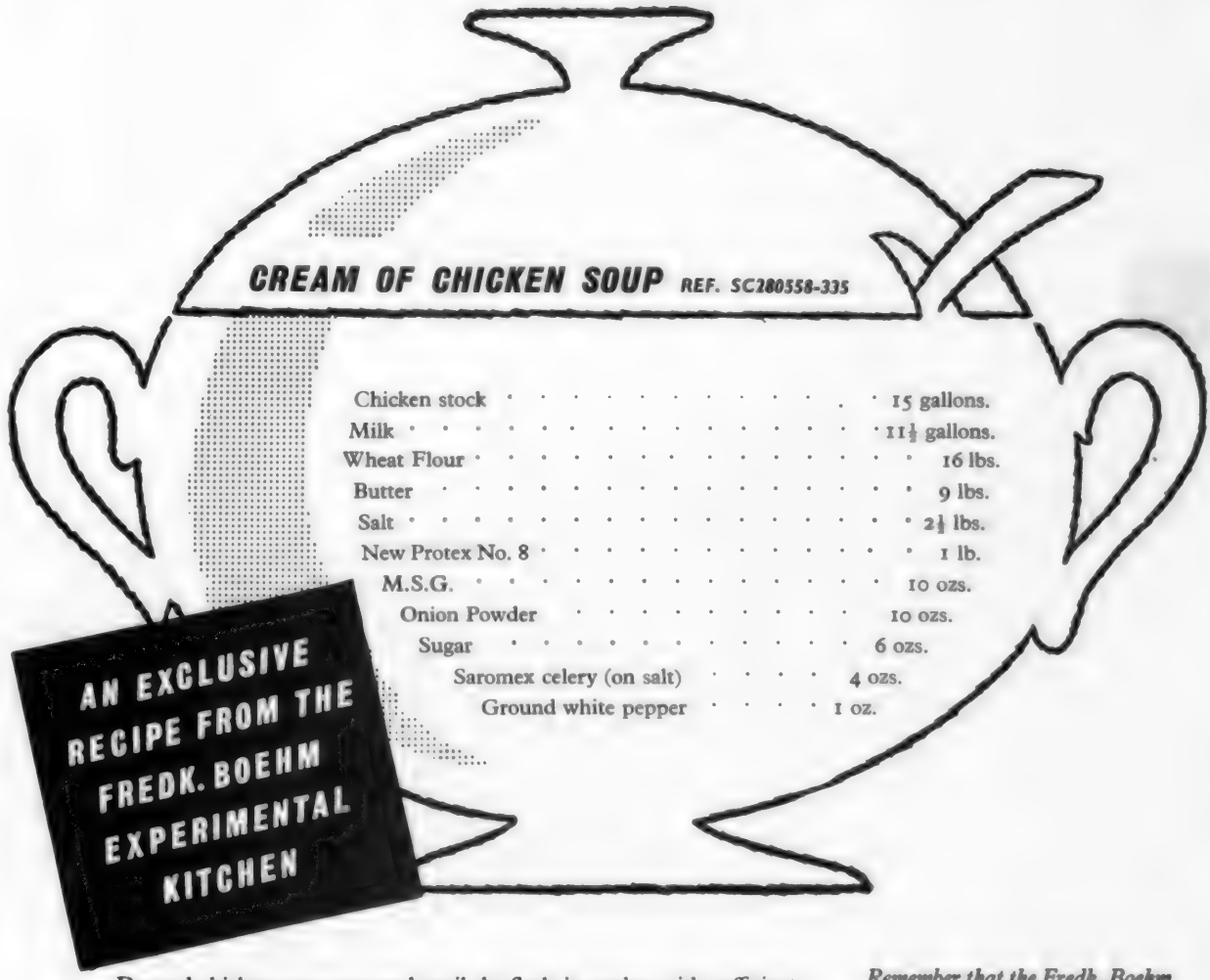
CREAM OF CHICKEN SOUP REF. SC280558-335
Chicken stock . . . . . 15 gallons.
Milk . . . . . 11½ gallons.
Wheat Flour . . . . . 16 lbs.
Butter . . . . . 9 lbs.
Salt . . . . . 2½ lbs.
New Protex No. 8 . . . . . 1 lb.
M.S.G. . . . . 10 ozs.
Onion Powder . . . . . 10 ozs.
Sugar . . . . . 6 ozs.
Saromex celery (on salt) . . . . . 4 ozs.
Ground white pepper . . . . . 1 oz.
AN EXCLUSIVE RECIPE FROM THE FREDK. BOEHM EXPERIMENTAL KITCHEN

Dressed chickens are processed until the flesh is tender, with sufficient water to cover, in a retort. The meat is stripped from the bones and then chopped into small pieces. The residue is added to the liquor and re-processed to provide the stock, which is sieved before use.

The wheat flour is whisked with the milk before addition to the rest of the ingredients which have been previously brought to the boil in a stainless steel steam-heated jacketed pan, equipped with a stirrer.

The soup is then homogenized at 1,500 p.s.i. and then held at 200°F. prior to filling. ¾ oz. of chicken pieces is placed in each plain No. 1. Tall can and the soup then filled. After sealing the cans are processed for 1½ hours at 240°F. then water cooled. Yield: approximately 30 gallons.

Remember that the Fredk. Boehm Experimental Kitchen exists to help you. Perhaps you have a recipe of your own which is proving to be a problem; or perhaps you want a recipe prepared for you by experts. That is where our unrivalled experience can help you. Write to us at the address below. The service, by the way, is FREE.

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an extensive range—

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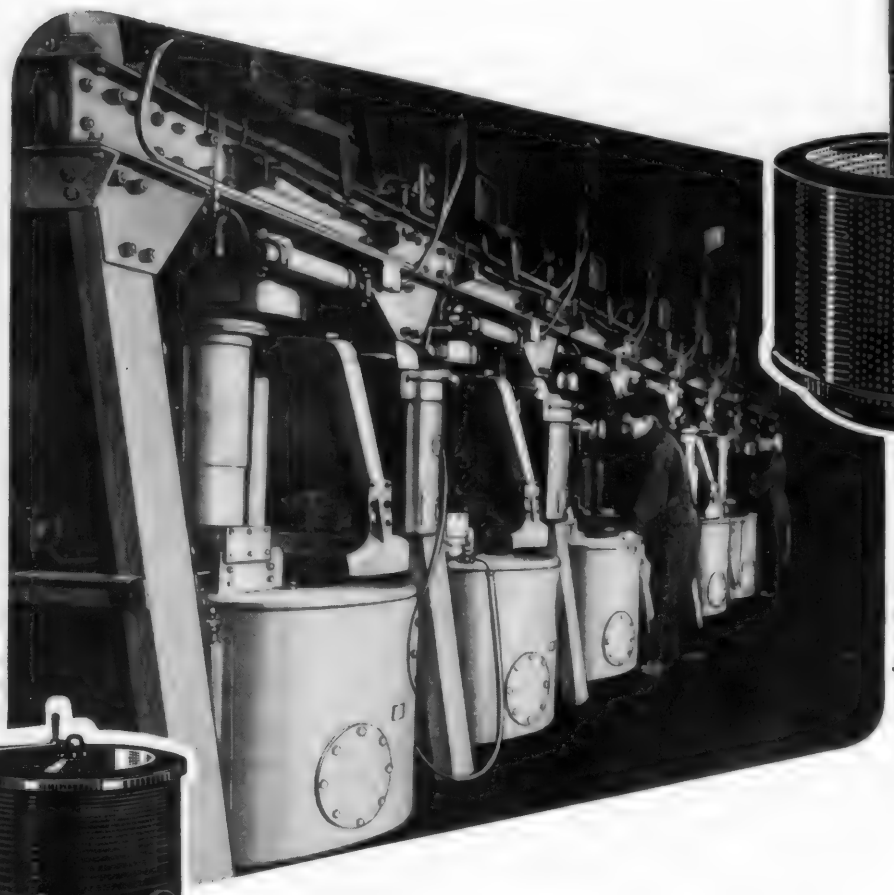

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Over 90 years experience in the specialised field of centrifuging enables us to recommend the most satisfactory equipment for increasing your production

THOMAS BROADBENT & SONS LTD., HUDDERSFIELD.

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Trucks and trolleys travel smoothly and safely on TRI-PEDAL unit system of iron paving

Fragile goods demand a level, truly stable flooring if they are to be moved without fear of damage. That is why Rowntree & Co. Ltd., the famous chocolate makers, have put down Tri-pedal paving. The three point support in each unit ensures no jolting and no possibility of dangerous projections. Moreover Tri-pedal is impervious to oils, greases and food acids; it is hygienic, dustless and odourless—in fact the ideal flooring for all food factories.

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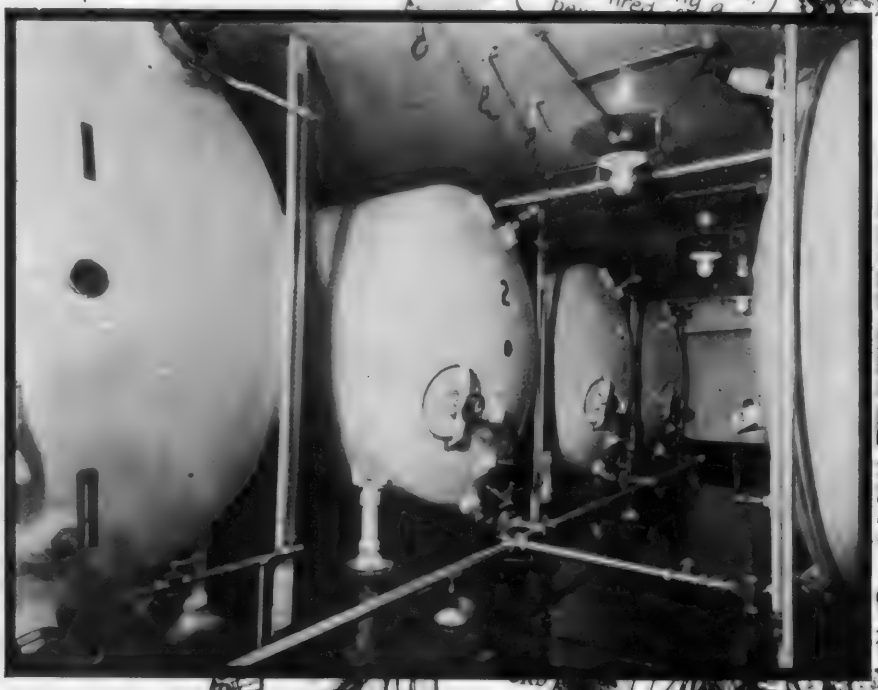
PFAUDLER and HORLICKS



I know - you're going to say that you forgot... that you were tired. Well, everybody's getting a little bit tired
AT THE DOCTOR'S
... a sort of day-to-day tiredness. It goes on and on, even after a long night's sleep
Isn't Daddy full of fun, Mummy! I'm so proud of him
TONIGHT HORLICKS FOR YOU

Horlicks Ltd. of Slough have recently installed a number of Pfaudler glassed-steel storage tanks for the milk used in the manufacture of their well-known beverage. Like so many other well-known food manufacturers, Horlicks Ltd. appreciate the absolute hygiene, cleanliness, and durability of Pfaudler plant. All Pfaudler glassed-steel equipment is covered by one year's guarantee and is backed by an efficient service organization.

Pfaudler GLASSED-STEEL EQUIPMENT

ENAMELLED METAL PRODUCTS CORPORATION (1933) LTD.,
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and DURIE FOUNDRY, LEVEN, FIFE.

ONE OF THE BALFOUR GROUP OF COMPANIES

500 clear marks a minute

The B-W BRUCEWAY Can Marker

THE BRUCEWAY can marker marks up to 500 cans a minute with a clear, clean, legible stamp. Marks any type of straight-sided cylindrical can up to $3\frac{3}{4}$" diameter on either end. Side rail twists are available for efficient reversing so that either top or bottom can be marked. The BRUCEWAY needs no power — effects a substantial saving in running costs.

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A MEMBER OF THE LARGEST DAIRY ORGANISATION

WILTS UNITED DAIRIES

An exterior view of the Chard Factory picturesquely situated on the banks of the River Axe.

No. 4 CHARD

BUTTER—100 TONS PER DAY

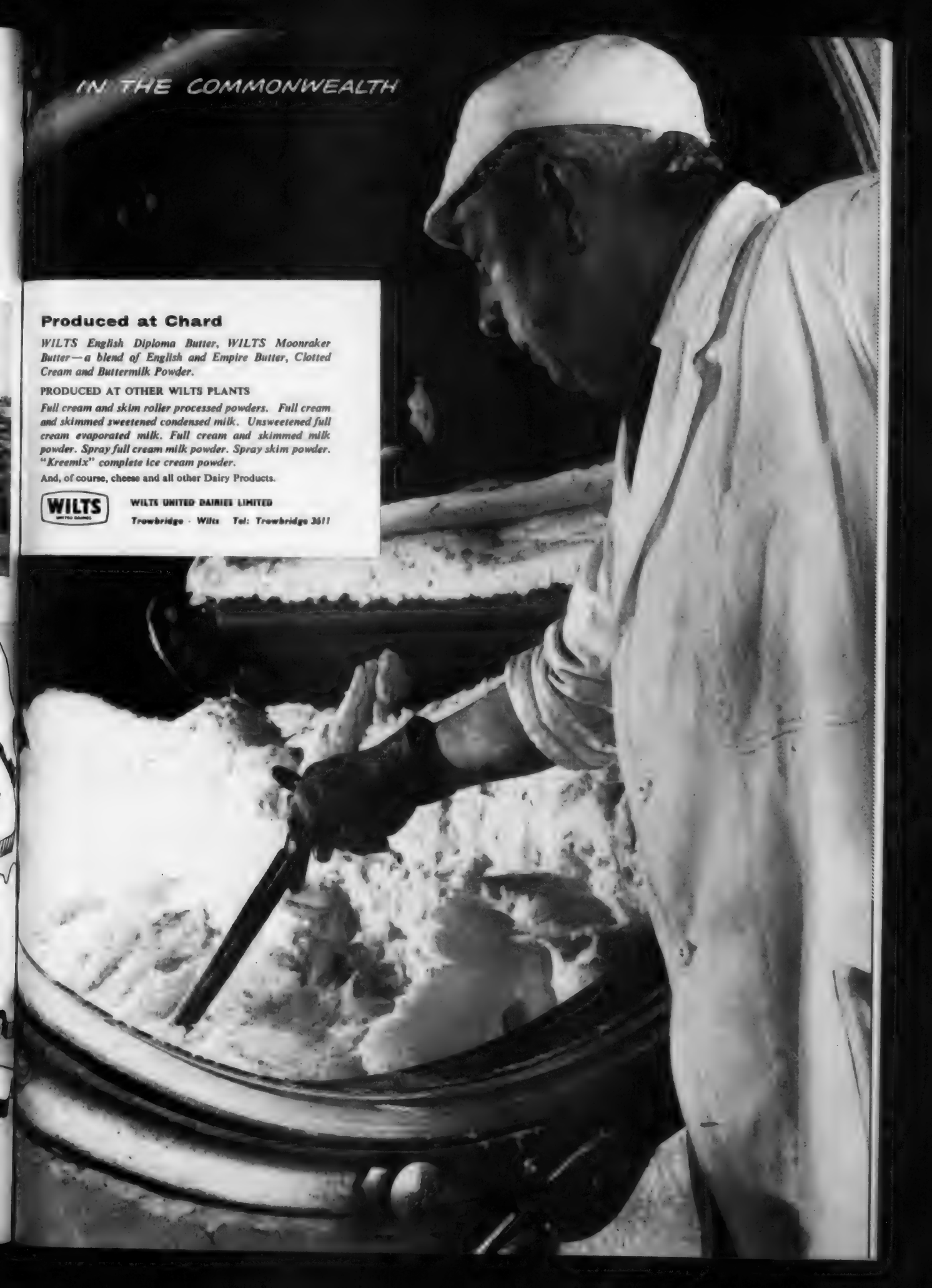
Standing on the borders of Somerset, Dorset and Devon is the largest butter creamery in the world.
This modern creamery is equipped to receive 40,000 gallons a day of high quality cream, separated from milk supplied by farms to other creameries in the best milk-producing counties in the country.
From the cream reception point to the loading and despatch bays, the strictest quality control and grading is maintained throughout all stages of production with tests carried out by a qualified staff in the fully equipped laboratory.
The creamery, which has a potential production during the peak milk season of 700 tons of butter per week —or enough to provide nearly 22 million people with a day's supply—recently achieved a world record output of over 100 tons of butter in a single day.
The freshly-made butter, prepared for both manufacturing, wholesale and retail distribution, is despatched to all parts of the country.

WILTS have an unequalled knowledge of milk products in this country; any information you may need on this subject is freely and gladly offered as part of their service.

This map shows the position of the Chard Factory and also the many other Wilts United Dairies Creameries and Plants all over the country.

FOR QUALITY AND SERVICE

WILTS
UNITED DAIRIES



Produced at Chard

WILTS English Diploma Butter, WILTS Moonraker Butter—a blend of English and Empire Butter, Clotted Cream and Buttermilk Powder.

PRODUCED AT OTHER WILTS PLANTS

Full cream and skim roller processed powders. Full cream and skimmed sweetened condensed milk. Unsweetened full cream evaporated milk. Full cream and skimmed milk powder. Spray full cream milk powder. Spray skim powder. "Kreemix" complete ice cream powder.

And, of course, cheese and all other Dairy Products.

WILTS

WILTS UNITED DAIRIES LIMITED

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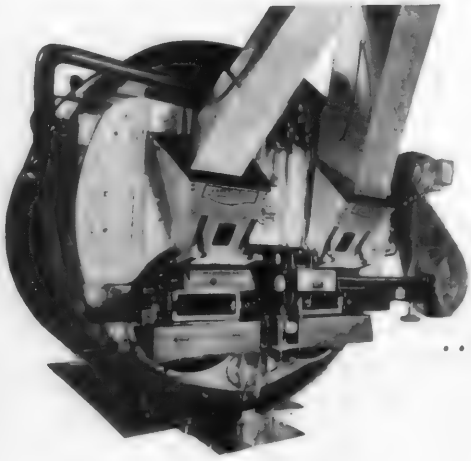
Monsanto Chemicals Plant, Newport.

...modern Industry needs modern BOILERS!



High efficiency with higher production is the keynote in all industries today. To achieve this, the power generation plant installed must be absolutely reliable and economical—that's why discriminating heating experts always make Paxman plants their first choice.

Keeping abreast of the complex plant requirements of modern industry has placed Davey, Paxman & Co. Ltd. to the fore in boiler and fabricated metal work manufacture. With the backing of over 90 years' experience they confidently say . . .

...whatever your problem—Paxman have the answer!

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- Stepless speed variation over a 9 to 1 output speed range (1/3 to 3 times the input speed).
- Constant horse-power transmitted throughout the speed range.
- Flange mounted motors (when required) giving output speeds from 320 to 2880 r.p.m. and from 480 to 4320 r.p.m.
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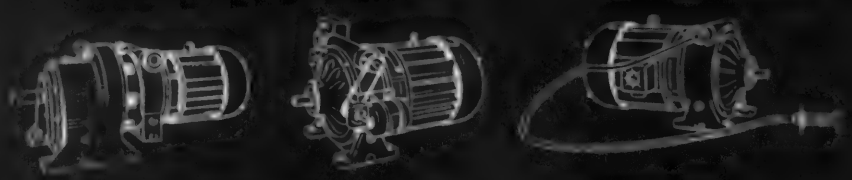
- Exceptionally light, sensitive and accurate control of speed setting.
- Co-axial input and output shafts which rotate in the same direction.
- Service reliability resulting from a simple design manufactured to high precision limits.
- Compactness, with consequent ease of mounting as an integral part of a machine.
- Vibrationless and silent performance.
- Standard range 1/33 h.p. to 15 h.p.

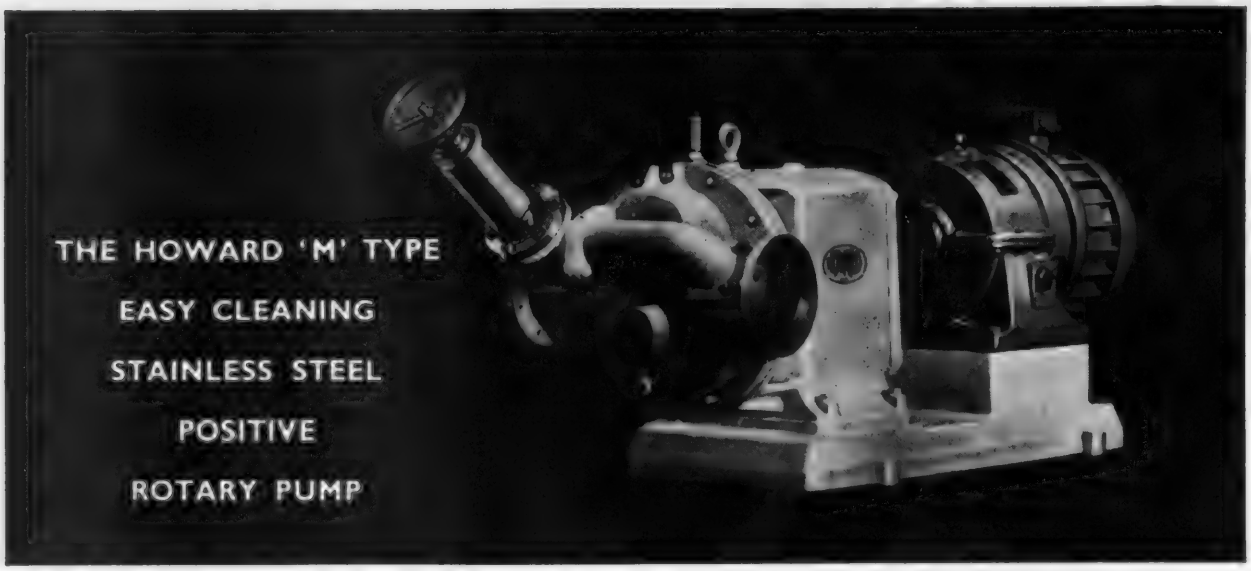
1½ h.p. unit with free shaft ends

A GEARLESS GEARBOX ...

Kopp



PLEASE ASK FOR ONE OF OUR DEMONSTRATION VANS TO CALL AT YOUR WORKS



Positively the ONLY pump with all these features!

★ No contamination of the product being pumped, by oil or grease, as all bearings are external to the pump chamber.

★ No churning or agitation of liquids—the pump can be used to handle sensitive liquids on account of its moderate running speed.

★ Easy dismantling for cleaning and reassembly by unskilled labour.

★ No contact of moving parts in the pump chamber.

★ Large suction and discharge passages and easy streamlined flow through the pump enable it to handle thick and viscous liquids with ease.

★ Built-in, hand-operated Volume Control for regulating pump output is incorporated in the pump casing, if required. This cuts out all unnecessary pipe-work, but must be specified when ordering.

★ Pumps can be supplied with branches screwed to suit customers' specific requirements, such as:—A.P.V./R.J.T. to B.S.S. 1864, A.P.V./S.P., American-type Acme thread cone fittings, B.S.P., or if preferred, flanged connections.

★ Positive-acting.

★ If required, mechanical gland seals can be fitted at extra cost in place of the normal packed gland type stuffing boxes.

Howard Stainless Steel 'M' Type Rotary Pumps are specially designed for the Food, Chemical, Dairy, Brewing and allied industries *where ease of cleaning is essential.* The pump is constructed with a pump chamber overhung from the bearing housing, which makes all working parts readily accessible and reduces the number of glands from four to two. Made in seven sizes for capacities up to 15,000 g.p.h. and for heads up to 200 ft.

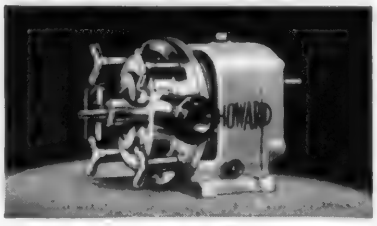
Howard

'M' TYPE ROTARY PUMP

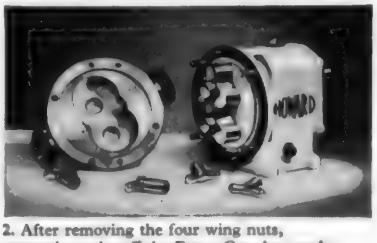
Also manufacturers of Howard Triplex, Centrifugal and Proportiometer Pumps

For further information, please write to:

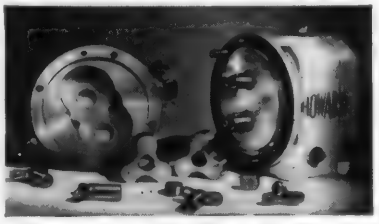
EASY DISMANTLING LIKE THIS ▼ in 60 secs.



1. Slacken off the four Rotor Case Retaining Wing Nuts.



2. After removing the four wing nuts, proceed to take off the Rotor Case by gently sliding it off the four studs.



3. Unscrew the two Rotor Retaining Nuts, slide the Rotors off shafts.

4. After removing the Rotors, pull the backplate forward over the two shafts; all components may then be cleansed with boiling water, or detergent.

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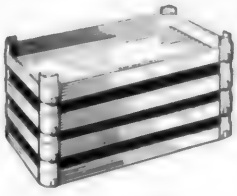

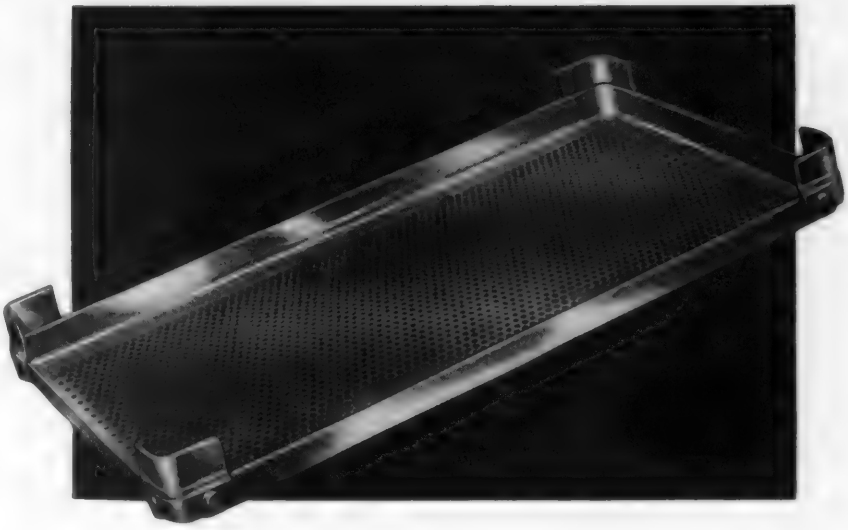

The illustration shows our standard tray T.27151 with perforated base and corner stacking brackets. Many of our extensive range of trays can also be supplied with perforated bases and stacking features—details given on request.

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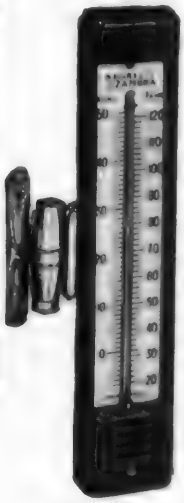

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4" Mercury-in-steel
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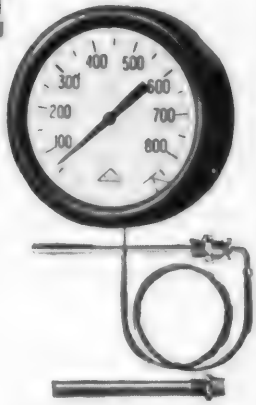
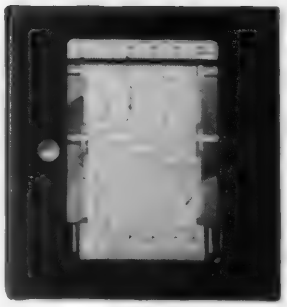
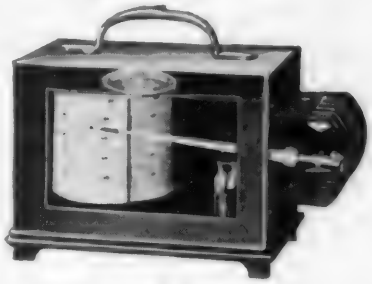
Rigid Stem Type



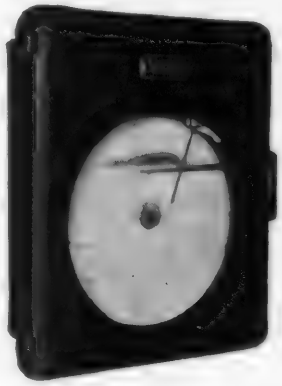
Distance-type Mercury-in-
steel Dial Thermometer



Resistance Thermometer
Recorder



Bi-metallic Recording
Thermometer



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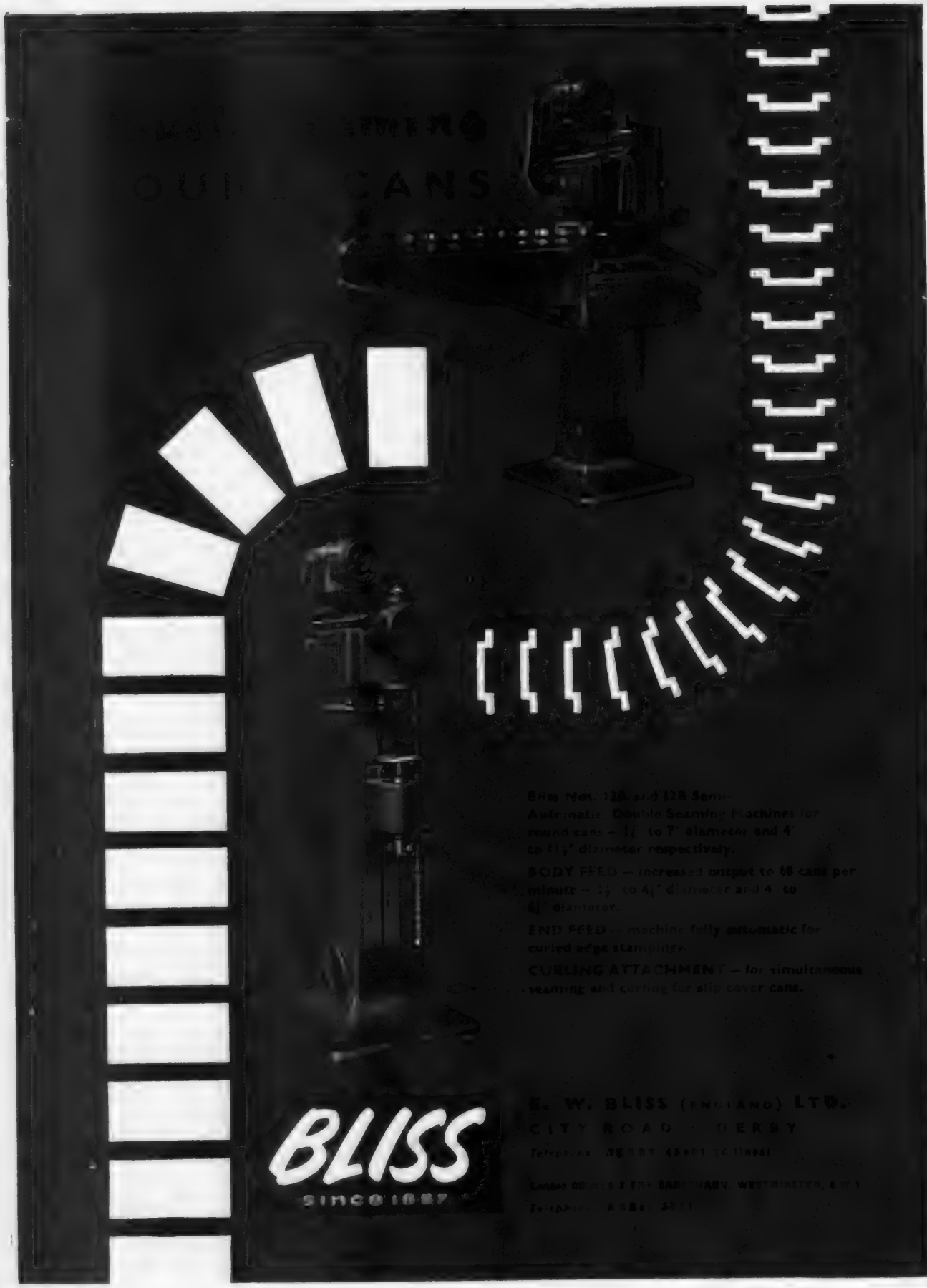
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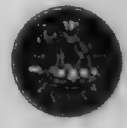

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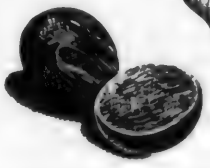

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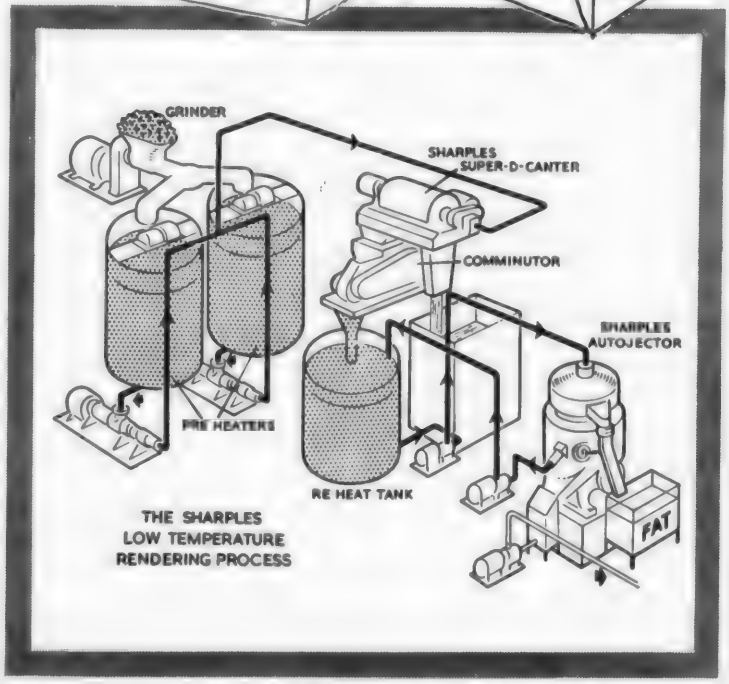

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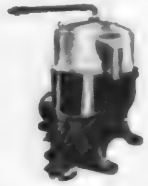
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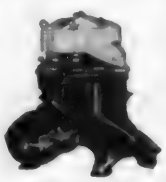
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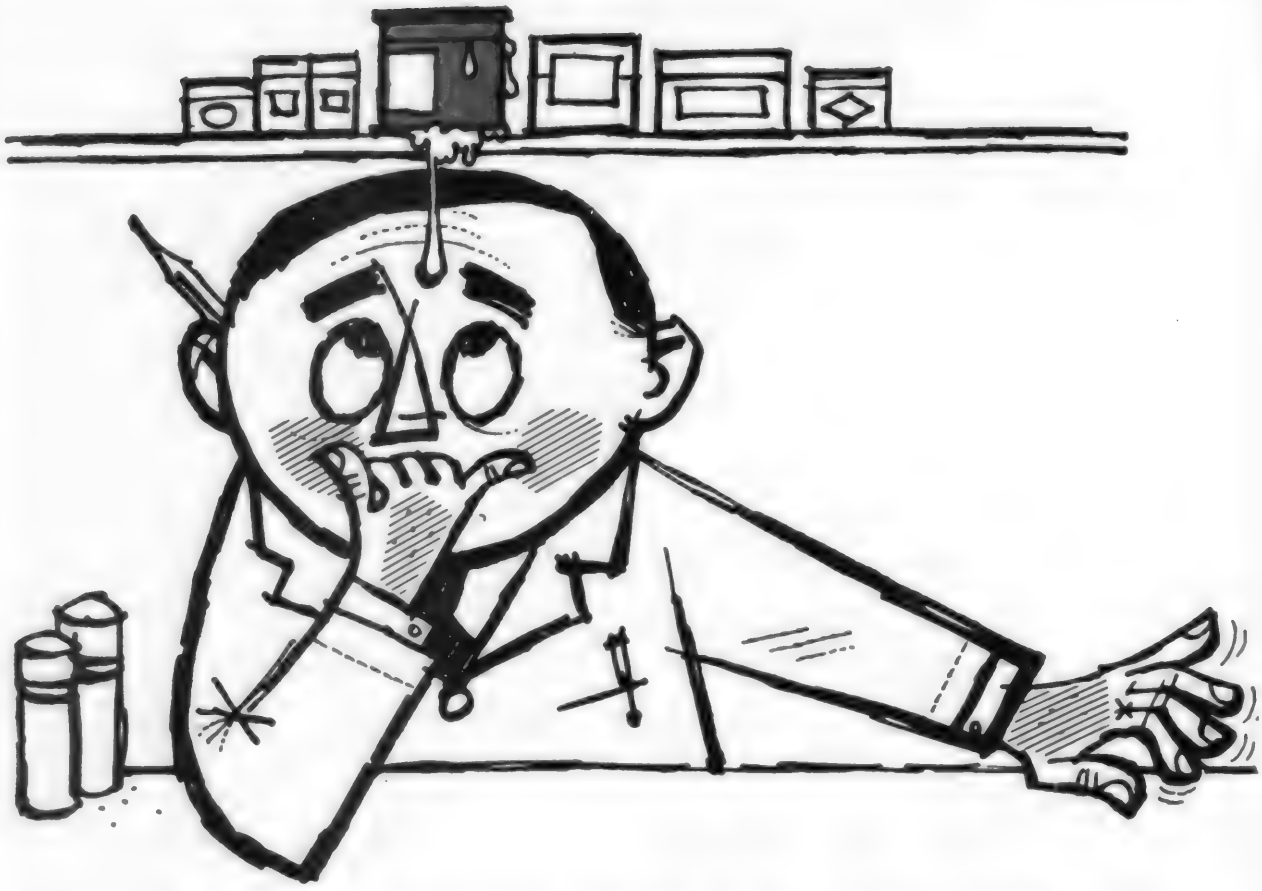

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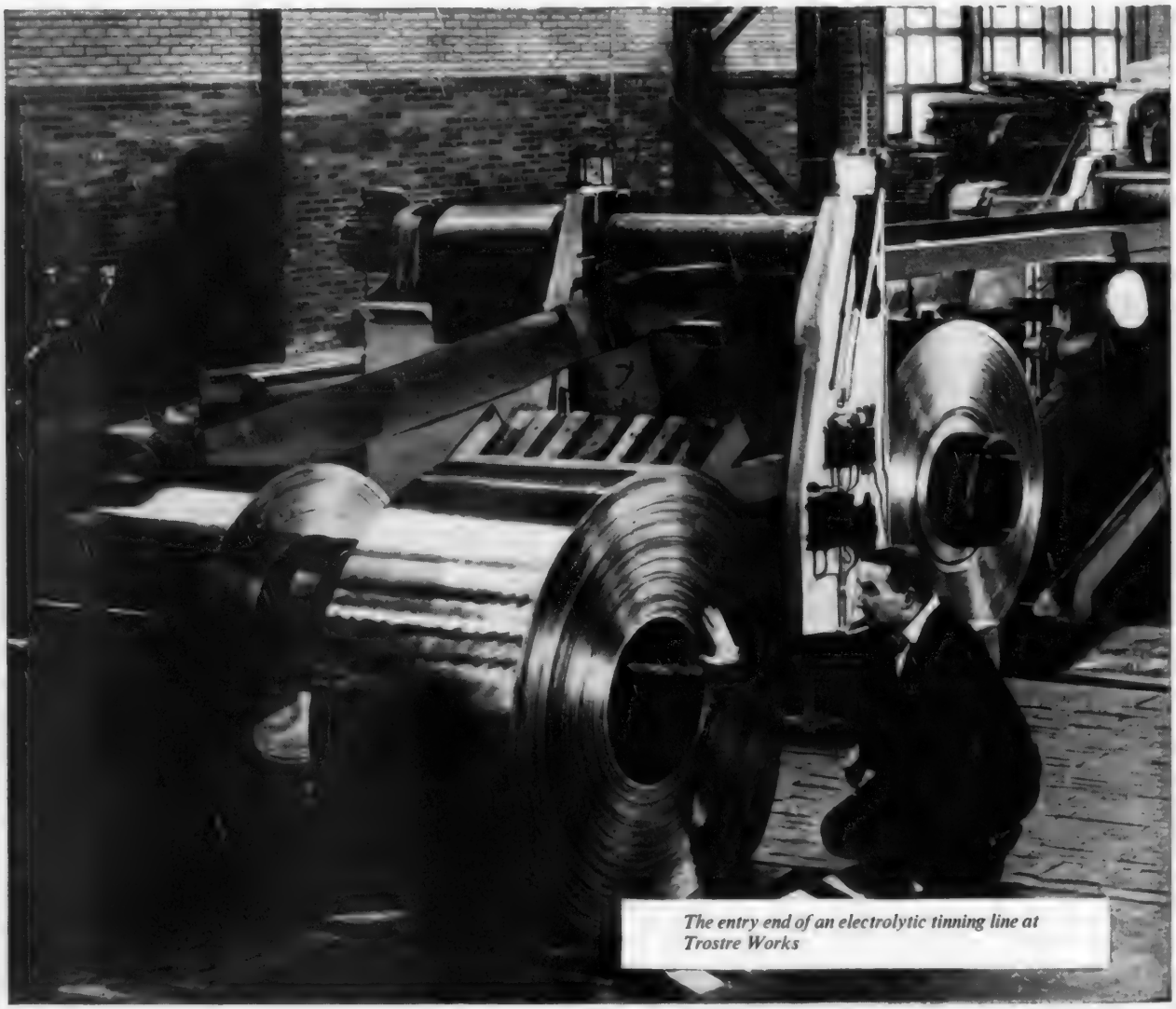
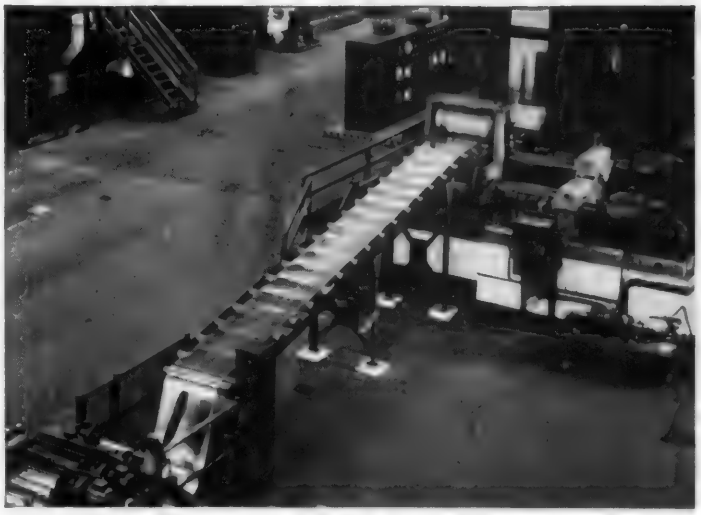
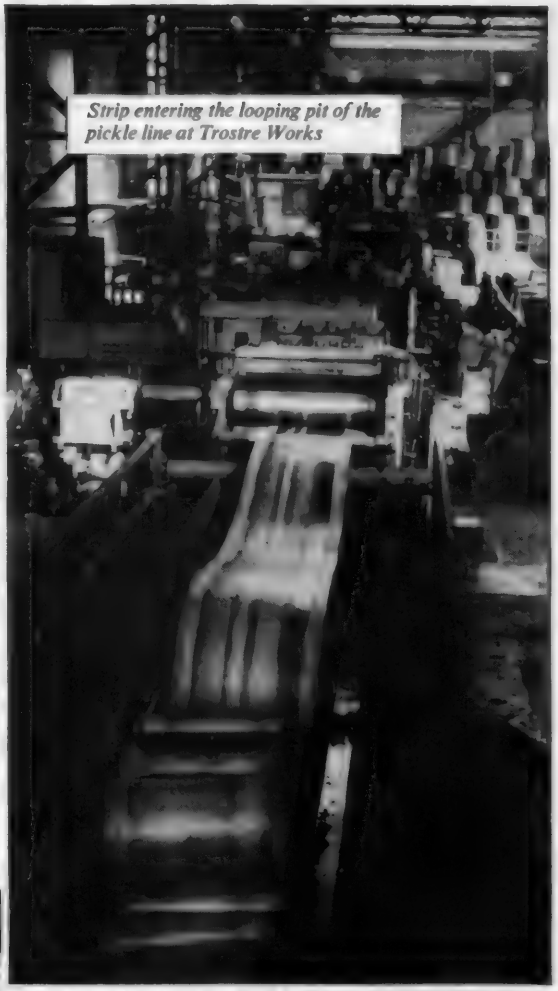


The entry end of an electrolytic tinning line at Trostre Works



Tinned strip entering the cutting and classification section of an electrolytic tinning line



Strip entering the looping pit of the pickle line at Trostre Works

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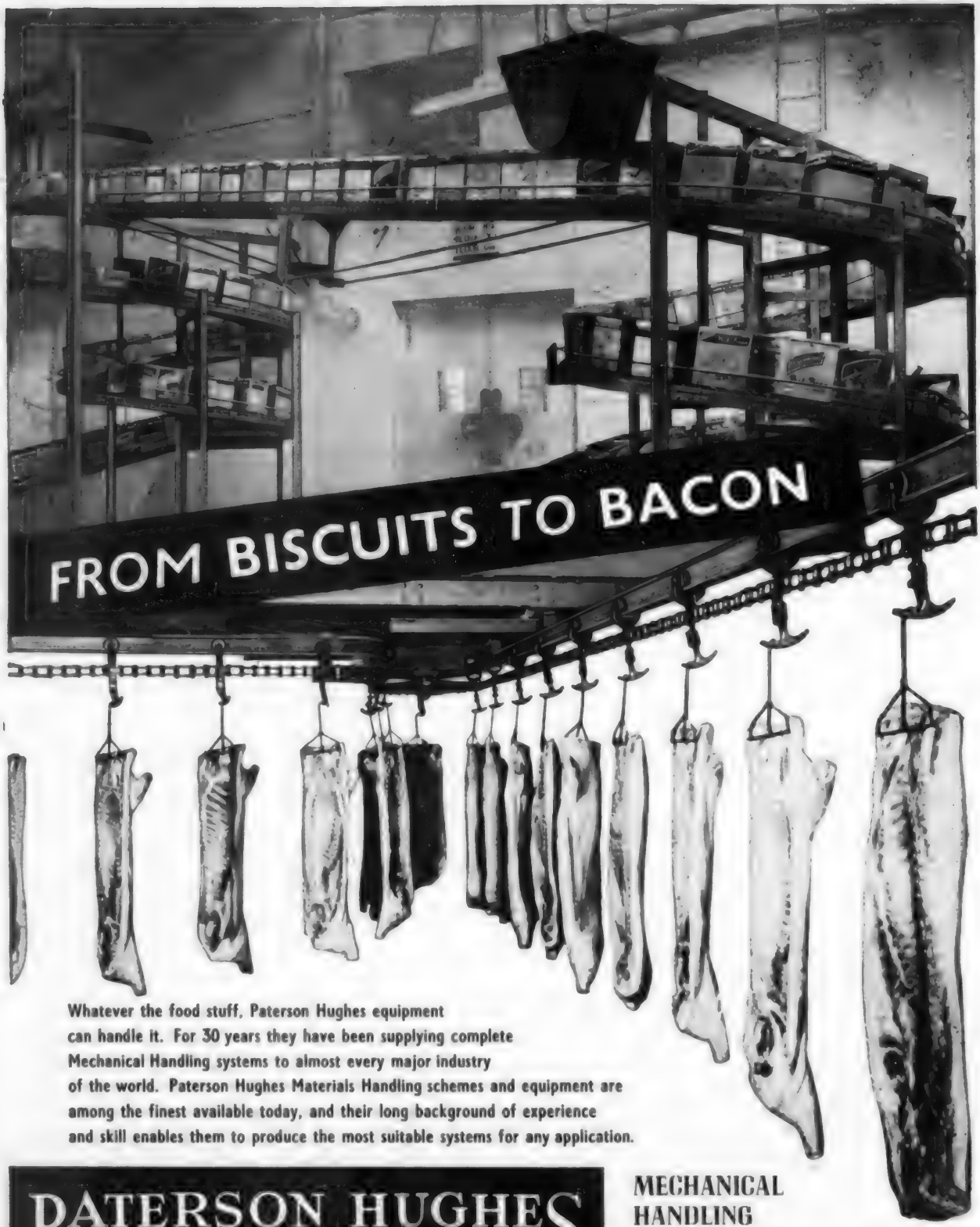
The exit end of one of the latest electrolytic tinning lines at Velindre Works



Whatever the food stuff, Paterson Hughes equipment can handle it. For 30 years they have been supplying complete Mechanical Handling systems to almost every major industry of the world. Paterson Hughes Materials Handling schemes and equipment are among the finest available today, and their long background of experience and skill enables them to produce the most suitable systems for any application.

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ENGINEERING COMPANY LIMITED

MECHANICAL HANDLING ENGINEERS AND CRANE MAKERS

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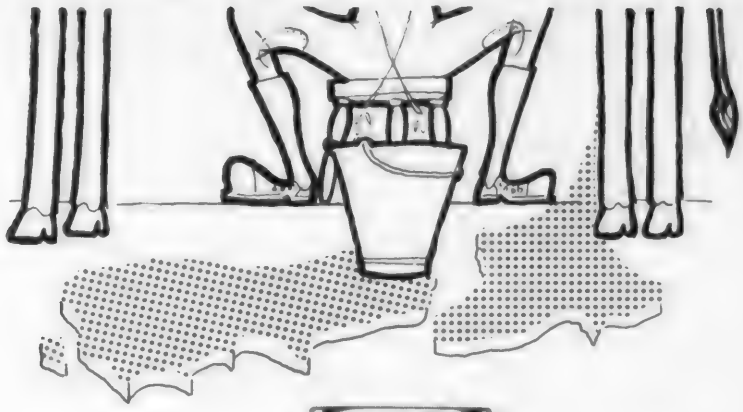
8 CHATHAM ST PICCADILLY MANCHESTER TEL CENTRAL 6623
PATERSON HUGHES ENGINEERING SA (PTY) LTD P.O. BOX 811 JOHANNESBURG

P.4339



acclaimed in New Zealand

Acknowledged as one of the world's leading Dairy Producers . . . New Zealand is aware of the tremendous advantages glass presents to the Food and Dairy Industries:

- **Cleanliness in production**
- **Unequalled purity of product**
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Q.V.F. Plant and Pipeline is in constant daily use in New Zealand by:

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Three Q.V.F. publications of interest to the Food and Dairy Industries are—*"Glass For Industry"*, *"Visible Flow Pipelines"* and *"The Climbing Film Evaporator"*. Write for your copies!

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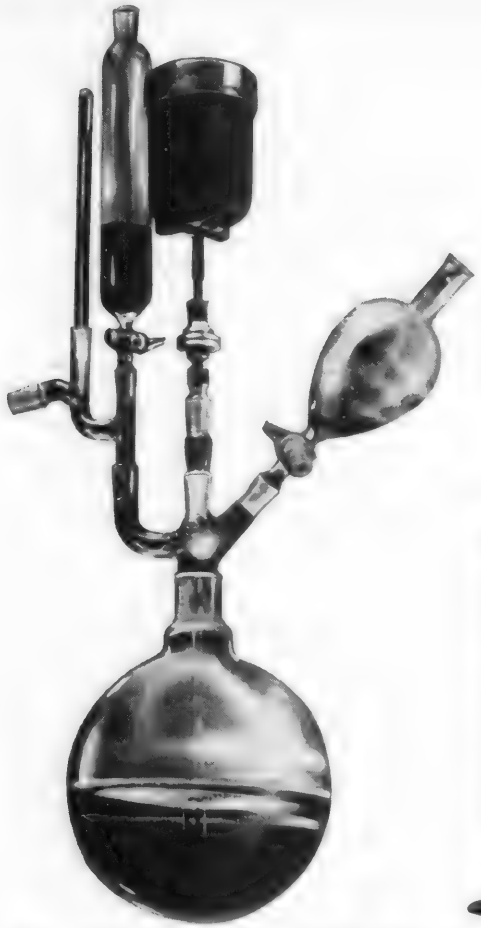


when your product begins as a formula...

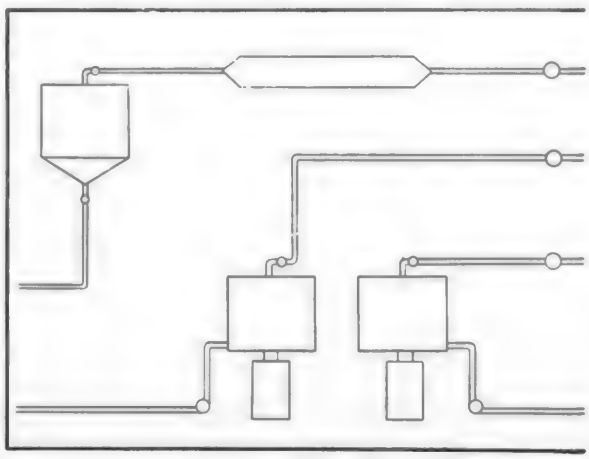
PRODUCTIVITY CALLS

FIRST YOUR FORMULA. It was born in your laboratory out of hard thinking, patient work and hopeful spending. Now it is ready to be turned into productivity and profits. Now speed comes into the picture; speed and volume. It's going to be thousands of gallons now, not pipettes full. Yet it has all got to be as precise in the factory as it was in the laboratory. Clearly a matter of measured batch dispensing and blending; a problem of process control.

THE AGE OF AUTOMATION

This was the picture we at Measurement had in our mind's eye when we were working on the Measurement *Automatic* Liquid Process Control system. Industry, we knew, would want accuracy and speed, and a modern way of applying it. An up-to-the-minute way. In this modern age the bucket is out, mainly because it excludes accuracy. Lifting and trucking must be eliminated because firstly it results in hold-ups, secondly in a waste of labour, and thirdly fatigue with its resulting fall-off in rate of production. Our equipment aims at automatically dispensing the right quantity to the right place at the right time, with all the necessary indication and records made automatically en route. The age of automation inspires sound business men to ask for the right installation for the job and no making shift. Control is the keyword.

"Backed by our years of experience", as the advertisements say (for we have been making liquid meters, pumps and electrical control apparatus for a very long time), we set about meeting this challenge. Years of research finally produced



the instrumentation that offered the flexibility which is essential, and the standardisation which makes the system an economic proposition for industry.

A FLEXIBLE SYSTEM

Today Measurement equipment is used in handling a large number of liquids in food manufacture, paper making, oil blending and chemical mixing processes. Liquids handled range from condensed milk to caustic liquors, and from benzine to beef dripping, and at Measurement Limited there is a catch phrase, " If it flows in a pipeline, then we can meter it".

ADVISORY SERVICE

We offer advice, designs and drawings to cover any complete liquid handling installation to suit any process—*your* own particular process. Given dimensional details, components can be supplied to be fitted into existing panels; otherwise we would supply complete wall-mounted or bench-mounted panels, or console models, tested and ready for installation. Servicing is a thing we regard as a duty at Measurement.

PUNCHED CARD SYSTEM

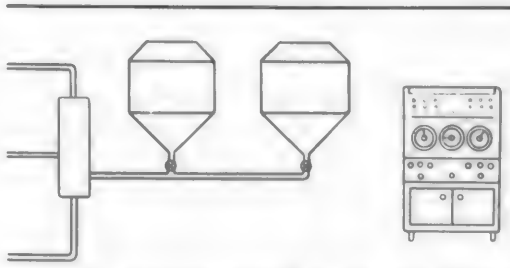
Not only does the Measurement system make Liquid Process Control merely a matter of pressing buttons, now batch delivery and blending can be completely preset and controlled by the punched card system!

SCRIBBANS-KEMP (BAKERIES) LIMITED
Control panel for automatic blending of liquids used in biscuit manufacture at the factory of Scribbans-Kemp (Bakeries) Limited, Grimsby.

FOR MEASUREMENT
LIMITED

A WIDE RANGE OF INSTRUMENTS

Whenever a liquid has to be handled, Measurement Limited make equipment to do the job, from indicating a total consumption of a liquid to the automatic dispensing, blending and mixing of various liquids.



Automatic dispensing of liquid from alternative storage tanks to a blending tank and to two rotary mixing machines. The three meters are denoted thus—○, and the three indicators are remotely mounted in a control panel with signal lamps to confirm operation of meters, valves and pumps.

The range of products include:—

(a) Meters made in various metals and moulded materials to enable almost any particle-free liquid to be metered.
(b) Meters with small pointer type indices.
(c) Meters with small direct reading counters.
(d) Meters with resettable direct reading numeral rollers.
(e) Meters with remote reading magnetic counters.
(f) Meters with horizontal or vertical large dial instruments having resettable pointers.
(g) Meters with automatic presettable indicators that enable the operation of valves, pumps and warning devices.
(h) Complete panels with auto preset indicators, signal lamps and push buttons for wall mounting or free standing.
(i) Schemes involving a number of meters dispensing liquids to one outlet.
(j) Schemes where a number of liquids are dispensed through one meter.
(k) Automatic actuation of metering equipment by photo-electric cell or contact operating devices.
(l) Complete panels incorporating mimic diagrams.
(m) Complete auto preset equipment that could be preset by a punched card reader unit.

★ *You may be tempted to tear out this advertisement for reference. Well, it's always a pity to spoil a book: get your Secretary to drop us a card and we'll gladly send you a reprint of these pages. A letter with more detailed requests will, of course, receive more detailed attention. Write to:—*

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The Jamaica Cooling Store

A view of the well laid out engine room

Loading into the Cold Stores

Island in the Sun chooses YORK REFRIGERATION

A factor in broadening the basis of Jamaica's economy and developing the island's citrus fruit industry is The Jamaica Cooling Store, erected by the Colonial Development Corporation.

The largest installation of its kind in the West Indies, there are eight chambers having a total capacity of 100,000 cubic feet. YORK Ammonia equipment is used throughout and flexibility in operation is provided by the multiplicity of units in all sections of the plant.

The project is enjoying success and is assisting greatly in increasing the quality and quantities of citrus fruit for export.

The Quality Name in Refrigeration

YORK SHIPLEY LIMITED

A Member of the Borg-Warner International Group

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How to reach the height of popularity

IT'S THE TOP QUALITY PRODUCT that heads
the popularity poll these days.
And a top quality product needs top quality ingredients.
Sometimes you have a choice of ingredients.
But not with milk. For that irresistible *fresh* flavour
you must have GOLDEN GLOW.
It's not just the experts who can tell the difference.
The public may not know that it's
GOLDEN GLOW that makes a product so good,
but they *do* know a good thing when they taste it!
GOLDEN GLOW has more virtues than first-class flavour,
it's economical. It's so much easier to store.
And it's so simple to handle.
If you want to know more about GOLDEN GLOW,
'phone us for a sample today.

Golden Glow English made Dairy Products

Spray and Roller Process ; Full Cream and Separated Milk Powder;
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all packed in containers to suit your requirements.

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IT'S HERE—THE

COMMER *Superpoise*

6 TON TRUCK

Latest and greatest addition to the quality-built 'Superpoise' range, this 6 tonner—based on a well-proved design—stands supreme in its class. Engineered from first class materials, robustly built and easy to maintain, it will give long periods of economical and trouble-free service.

✱ Choice of 3 great power units: 91 b.h.p. petrol with optional chrome bores; 83 b.h.p. 'P6' diesel; 104 b.h.p. 'R6' diesel. ✱ Deep-section chassis frame of *high-tensile* steel, and heavy duty rear suspension. ✱ Exceptional bodyspace—standard factory-built dropsider is 186 in. long. ✱ Superb visibility from low floor all-steel 3 seater cab equipped with every aid to driver comfort. ✱ Outstanding engine accessibility simplifies routine maintenance. ✱ Two-speed rear axle or synchromesh gearbox—with or without overdrive—available at extra cost.

A ROOTES PRODUCT—BUILT STRONGER TO LAST LONGER!

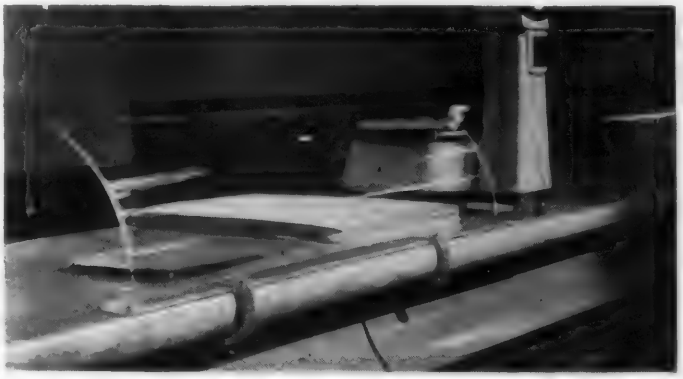
COMMER CARS LIMITED LUTON BEDS EXPORT DIVISION: ROOTES LTD. DEVONSHIRE HOUSE PICCADILLY LONDON W.1

Butter weighing shields made from 'Perspex' in a number of stores of Messrs. J. Sainsbury.

'Perspex' protects food in Sainsburys shops

MANY Sainsburys shops throughout the country use counter shields made from 'Perspex' acrylic sheet to protect food from dirt and dust and also shields to display food as well as protect it. 'Perspex' is an extremely hygienic material, easy to clean and maintain. It is, furthermore, an attractive material and one which can be easily shaped to modern designs.

'Perspex' is strong and light in weight. 'Perspex' is available in a wide range of transparent, translucent and opaque colours as well as in clear and opal sheet.



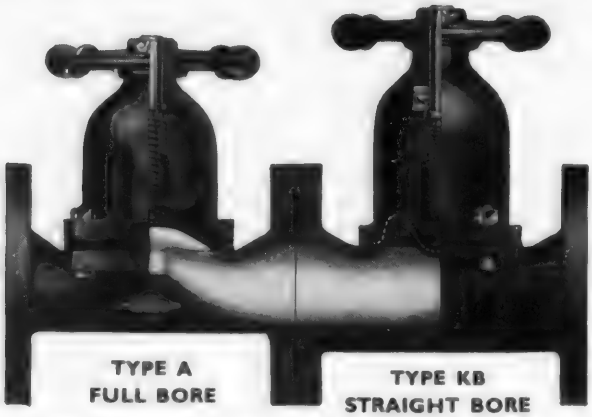
Counter Screen made from 'Perspex' as used by Messrs. Sainsburys in a number of their shops.

'PERSPEX'

'Perspex' is the registered trade mark for the acrylic sheet manufactured by I.C.I.

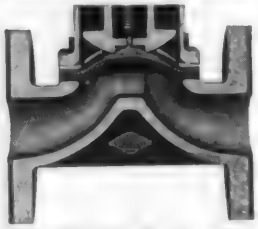
IMPERIAL CHEMICAL INDUSTRIES LIMITED · LONDON · S.W.1

P.663

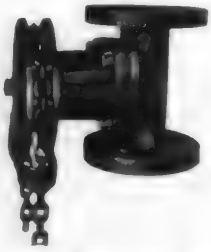


For the SAFE handling of Fluids encountered in food manufacture

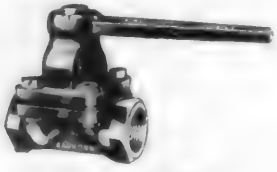
Diaphragms are made in numerous grades for handling hundreds of fluids.



Glass-lined bodies provide hygienic conditions for edible fluids.



Chainwell Operation for inaccessible locations.



Lever Operated (quick action) Valves. On—off by quarter turns of lever in sizes ½"–1½". Signal type lever can be locked in any position for larger valves 1½"–4".

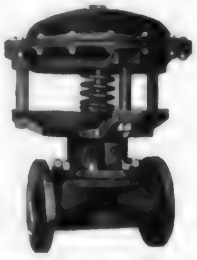
SAUNDERS DIAPHRAGM VALVES

Both valves have flexible diaphragm closure and the same method of isolating fluids (however delicate or damaging) from the mechanism. Both are of simple 3 unit, glandless construction readily dismantled for inspection and maintenance. Both are available in various materials and the flanged types can be supplied with bodies lined with rubber, glass or lead. Type A has streamline bore. Type KB has straight bore which permits rodding through for removal of built-up deposits.

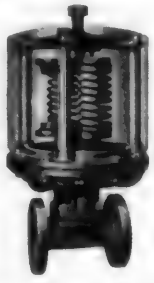
R.S.V.P. to S.R.V.P.

In any problem involving fluid control submit your queries to

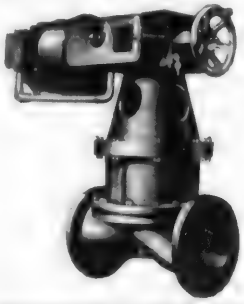
SAUNDERS VALVE RESEARCH PANEL



Pressure Closing. With low pressure operating diaphragm for remote or automatic control.



Pressure Opening with inverted overhead diaphragm. Spring pressure to close in event of accidental or intentional cut in pressure.



Direct electrical actuation for remote or local control. Sizes ½"–14"

SAUNDERS VALVE COMPANY LIMITED

DIAPHRAGM VALVE DIVISION

CWMBRAN NEWPORT MONMOUTHSHIRE

PROBLEM	
Product	Cream of Tomato Soup
Throughput	100–400 gallons per hour
Power	under 3 h.p.
Location	very little floor space available
Labour	only semi-skilled available
Quality control	a smooth, completely homogenous soup
Budget	£300

The RAPISONIC homogenizer takes such jobs in its stride. Draw upon specialist experience and get full details of machines for your production now

ANSWER

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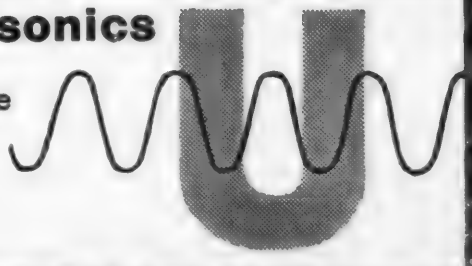
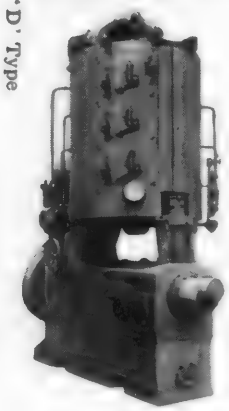


HIGH capacity and yield

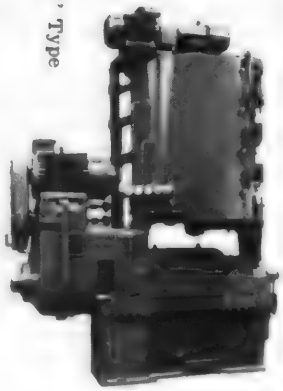
LOW initial and operating costs

ROSEDOWNS **MAXOIL DUPLEX** OIL EXPELLERS

'D' Type



'C' Type



'D' TYPE

The 'D' type "Maxoil-Duplex" expeller will process all commercial oilseeds and is particularly suitable for operation on the softer seeds such as decorticated groundnuts or cottonseed. On these seeds the 'D' type will press between 10 and 20 tons per 24 hours leaving a residual oil content in the expeller cake down to 3.5%

'C' TYPE

The 'C' type "Maxoil-Duplex" is highly developed and very widely used for the single pressing of palm kernels and other oilseeds. Capacities up to 20-tons per 24 hours and expeller cake oil contents down to 3.8% are obtained.

Write for details of the following :

Chemical plant and machinery for oilseed and compound milling, batch and continuous solvent extraction plant, screw presses, fish meal and whale processing, animal, marine and vegetable oil refining, and hydrogenation etc.

ROSE, DOWNS & THOMPSON LTD

Old Foundry, Hull, England.

London—39 Victoria St., S.W.1

Member of the Power-Gas Group

Already recognised as a valuable guide to industrial catering, this book has now been awarded a Silver Medal at the International Cookery Exhibition, 1956 Frankfurt.

FACTORY CANTEENS

THEIR MANAGEMENT IN GREAT BRITAIN

by **JACK HAMPTON**

115 pages First edition Price 15s. net

Postage: 10d. Home 1s. 9d. Abroad

Balancing the Canteen Budget . The Factory Canteen Licence . Methods of Factory Canteen Management . Factory Canteen Kitchen and its Equipment . Canteen Furniture . Kitchen Personnel . Tea for the Factory Worker . Crockery, Cutlery and Dishwashing Machines . Purchase of Food . Canteen Stores . Canteen Bakery . Central Kitchens for Docks and Building Sites . Special Diets in the Factory Canteen . Factory Canteen Cleaning . The Risk of Food Poisoning . The Factory Mess Room Regulations . Meal Regulations for Women in Industry . Meal Regulations for Young Persons . Training Courses for Canteen Staff . Entertainment in the Canteen . The Company Shop . Industrial Hostels . Works Sports Clubs . Development of the Factory Canteen . The Future of the Factory Canteen.

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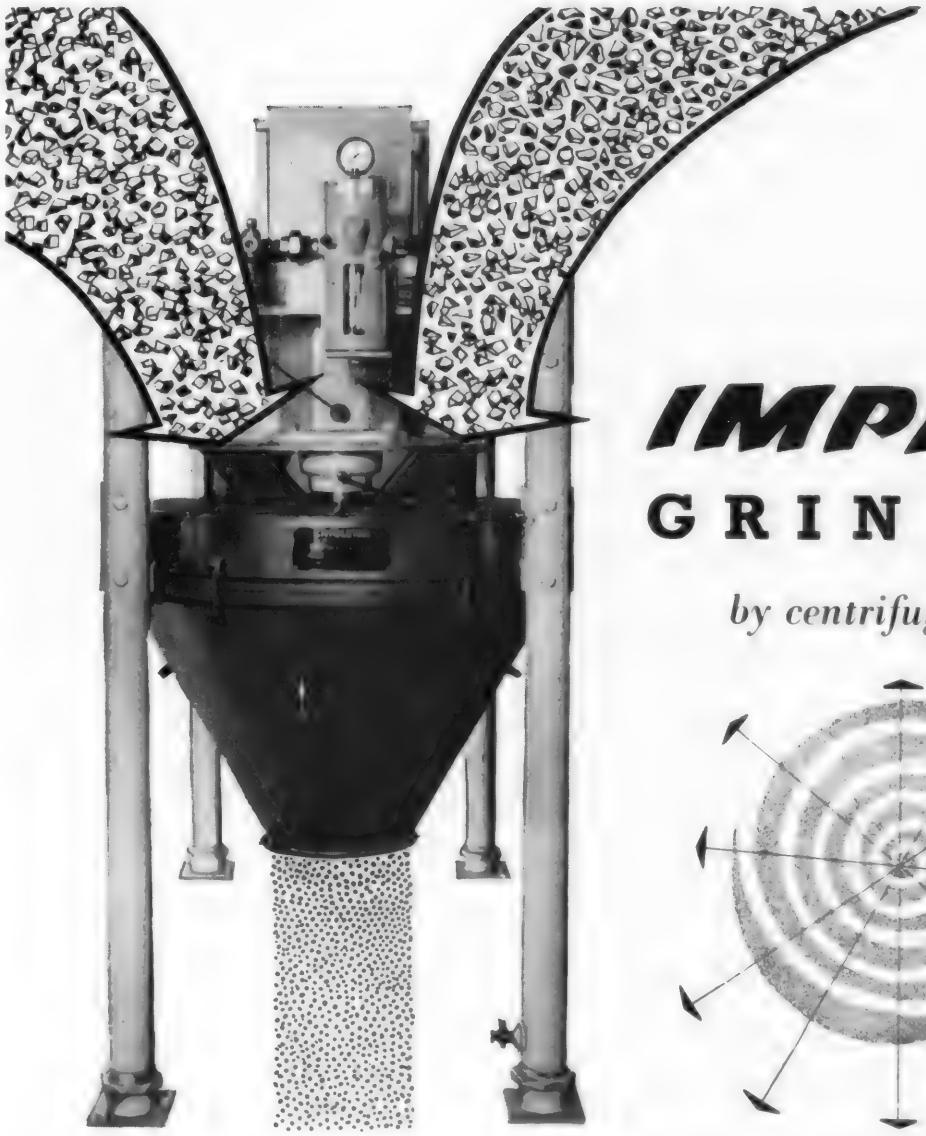
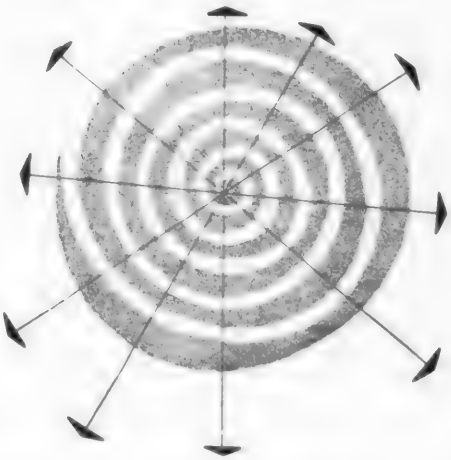


IMPACT GRINDING

by centrifugal force



Entoleter Mills grind and pulverise through IMPACT. A high-speed rotor hurls the materials with shattering centrifugal force against impactors and the particles are broken down instantaneously to a pre-set uniform size. The rotor speed controls the degree of reduction and most powdered and granular materials can be ground accurately. Heat generation is negligible. Capacities range up to 20,000 lbs. an hour.

Materials handled include:

Starches · sugars · flour · whey powder liver meal · cotton seed husk · salt · feeds maize · meals · etc.

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HOPKINSONS'
BRONZE VALVES
sizes up to 2" bore

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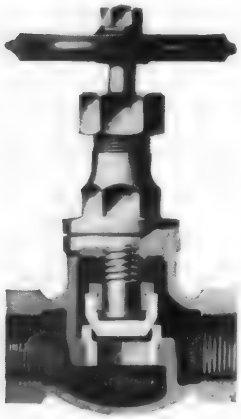
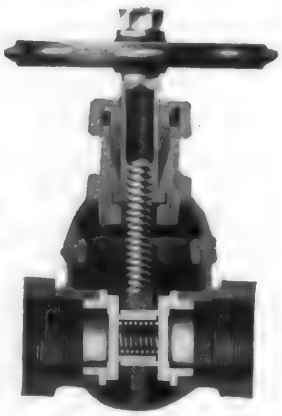


"S. T. S." VALVES

Sturdy general-purpose valves for isolating or regulating purposes. Screwed or flanged connections available.



PARALLEL-SLIDE VALVES

Reliable general-purpose valves for duties where the flow is in either direction. Screwed or flanged connections available.

LINK VALVES

Robust quick-opening valves on parallel-slide principle. Easy to operate, suitable for many duties including process steam control, compressed air, thick heavy liquids, etc. With screwed connections.

All the above valves are for pressures up to 250 lb/sq. in. (steam) or 350 lb/sq. in. (cold water, air, oil, etc.)

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Eliminators of HEAVYWEIGHTS and LIGHTWEIGHTS!

Woods Automatic Weight Control has strong claims to priority status in the field of bakery equipment. Higher yield inevitably results from its installation. Operating at the divider stage it automatically adjusts the volume of the divider pocket, perpetually eliminating the ever present tendency to lightweight and heavyweight runs. But W.A.W.C's virtues are many sided and further details should be asked for.

Write for APPROVAL TERMS

WEIGHT CONTROL for DOUGH DIVIDERS

WOODS AUTOMATICS LIMITED
BANASTRE ROAD, SOUTHPORT
Telephone: SOUTHPORT 56825-6
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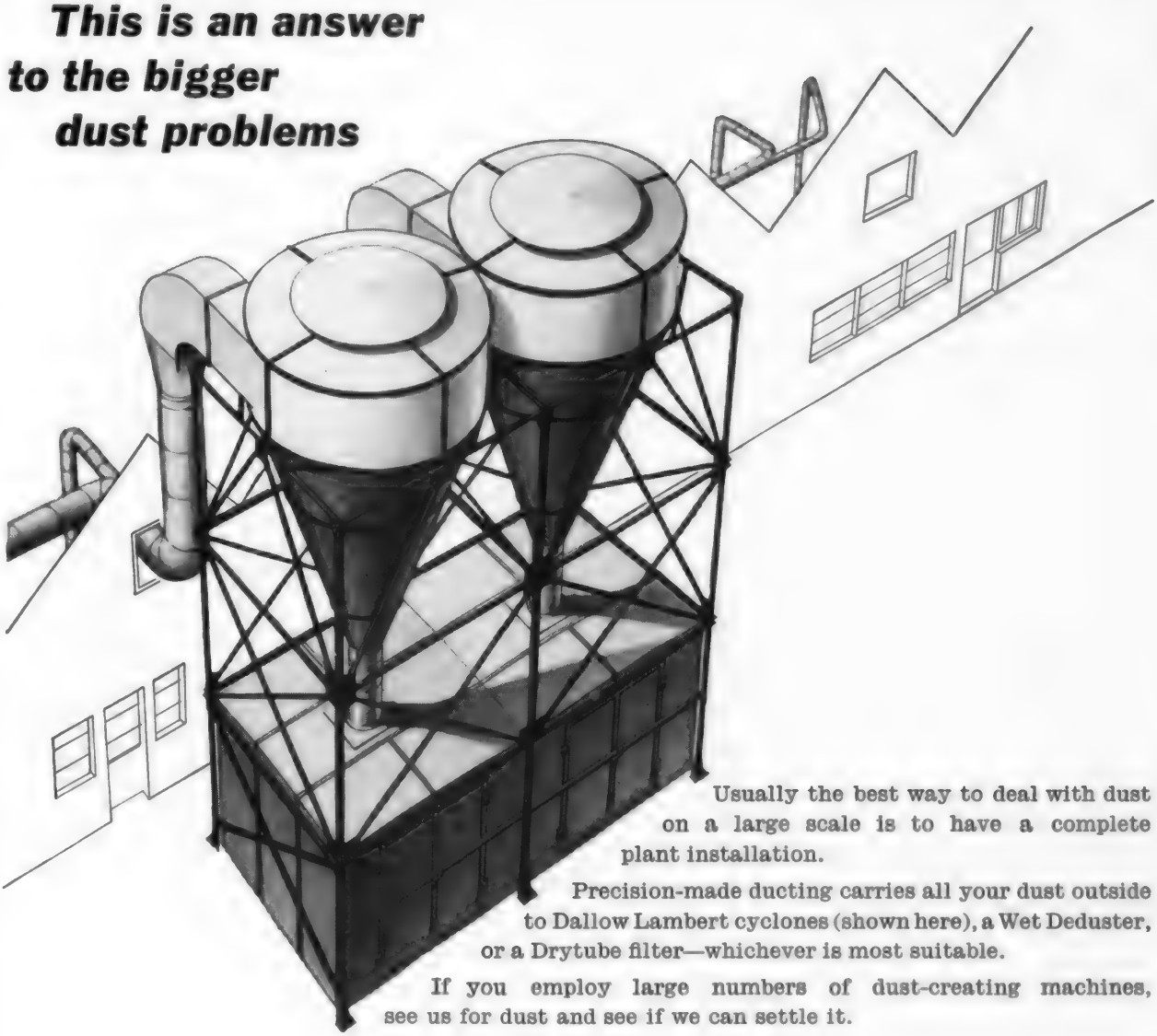
This is an answer to the bigger dust problems



Usually the best way to deal with dust on a large scale is to have a complete plant installation.

Precision-made ducting carries all your dust outside to Dallow Lambert cyclones (shown here), a Wet Deduster, or a Drytube filter—whichever is most suitable.

If you employ large numbers of dust-creating machines, see us for dust and see if we can settle it.

see us for dust

DALLOW LAMBERT

DUST CONTROL EQUIPMENT FOR INDUSTRY

There's a resident Dallow Lambert man in your area

DALLOW LAMBERT & COMPANY LIMITED, THURMASTON, LEICESTER

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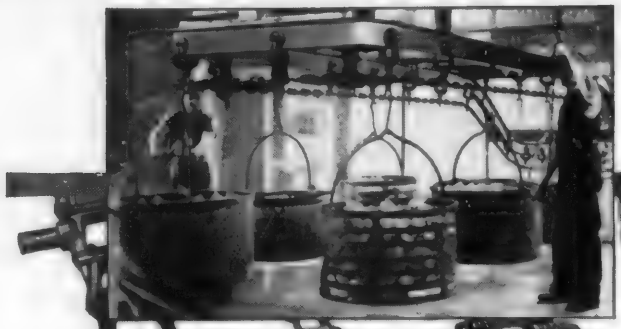

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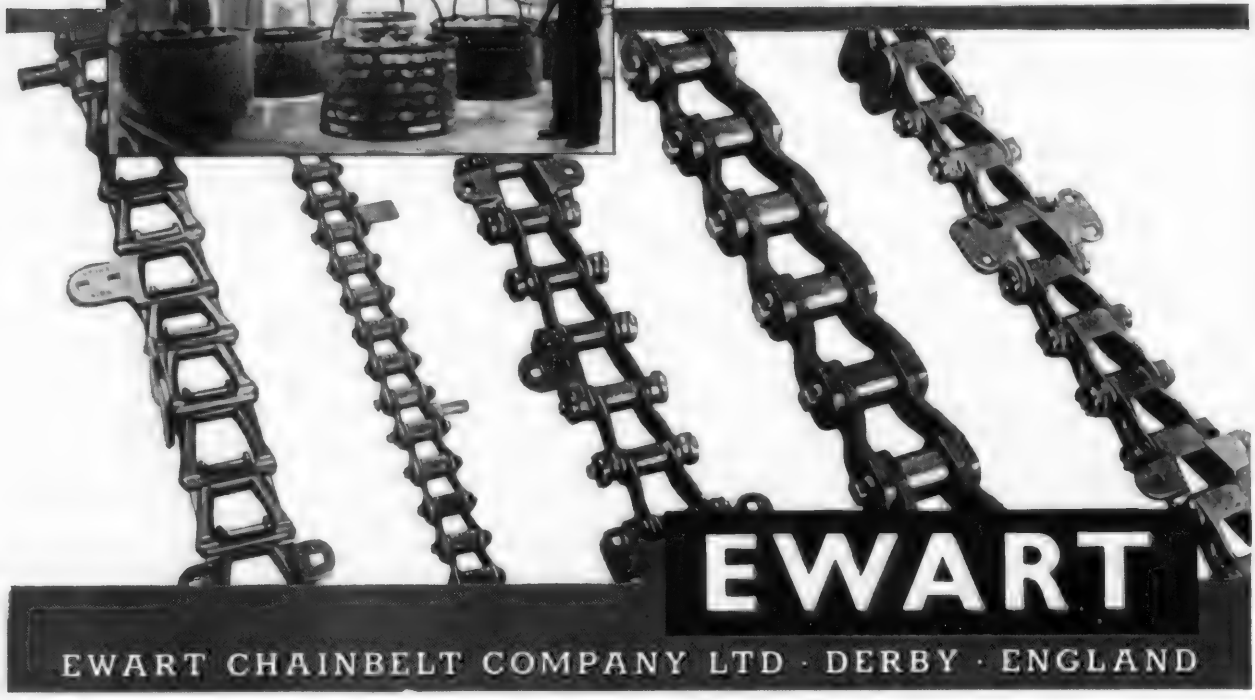

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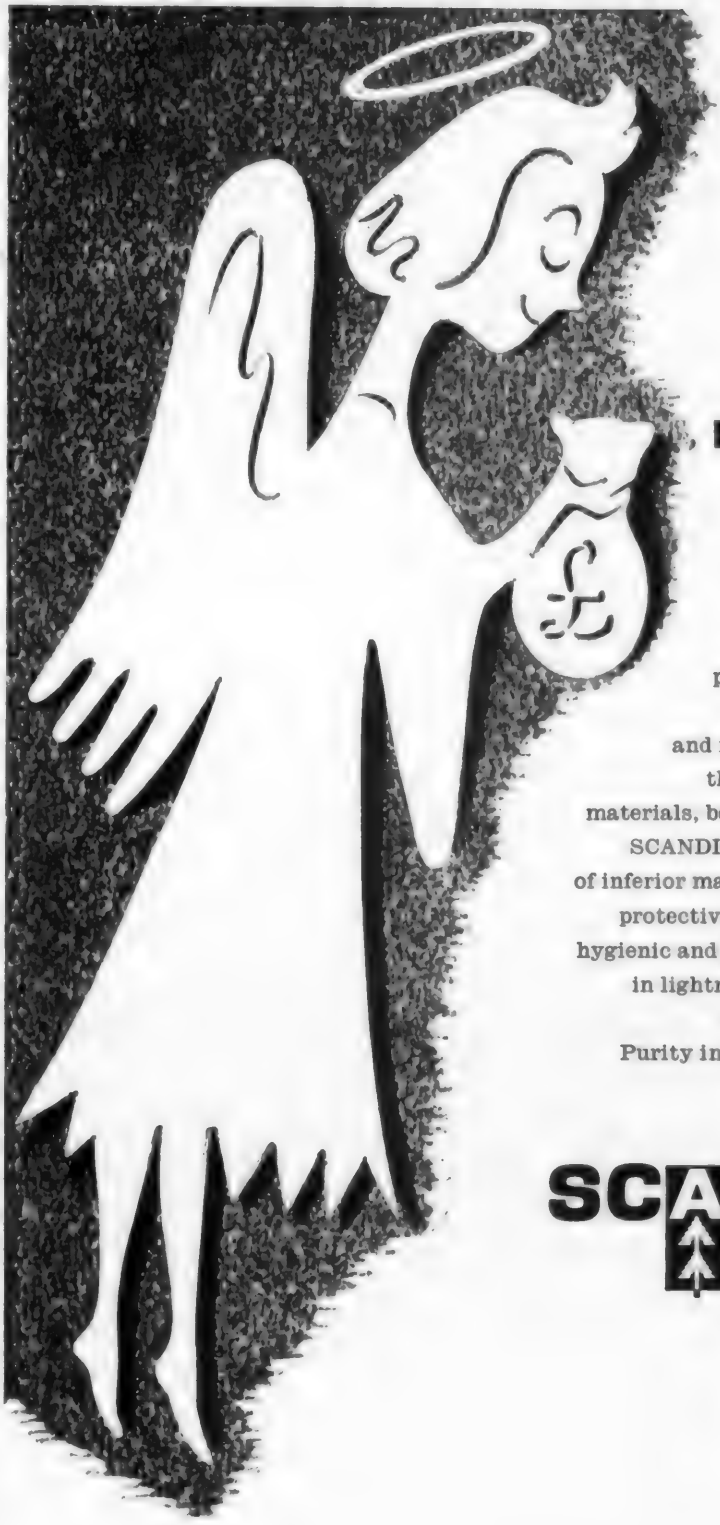

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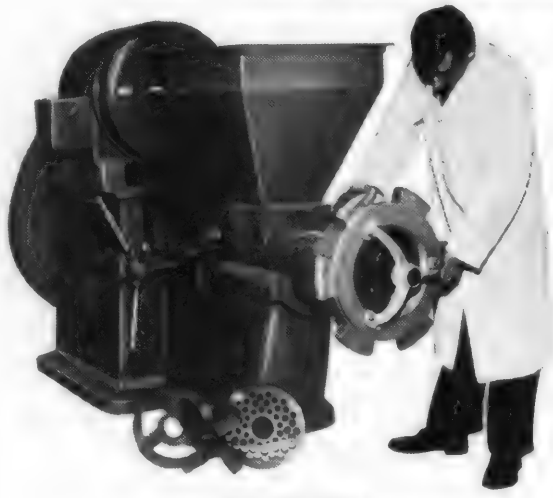

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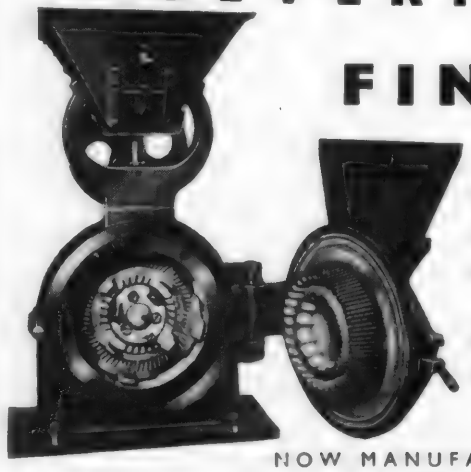

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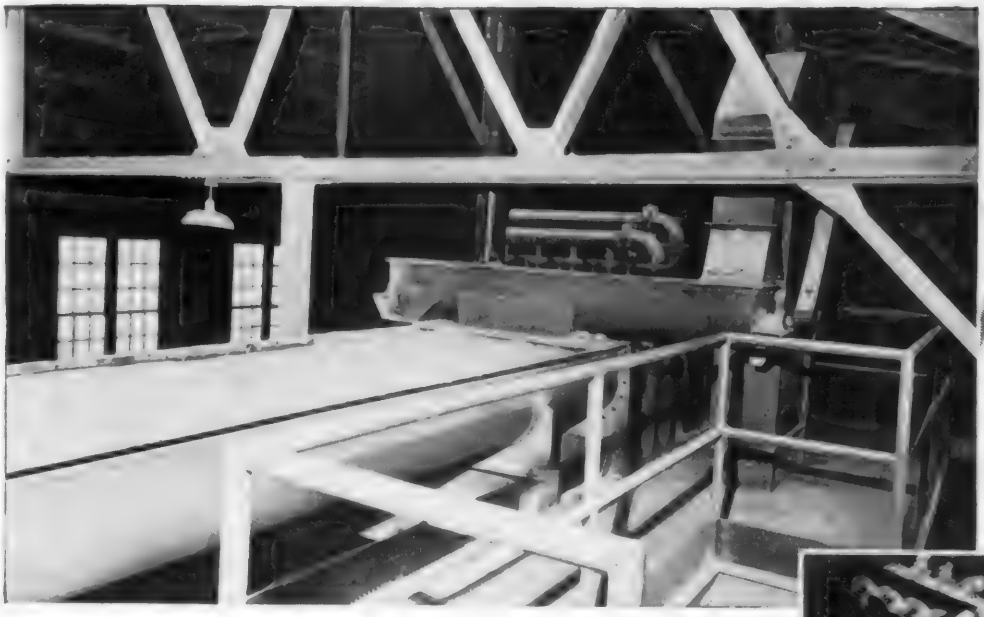

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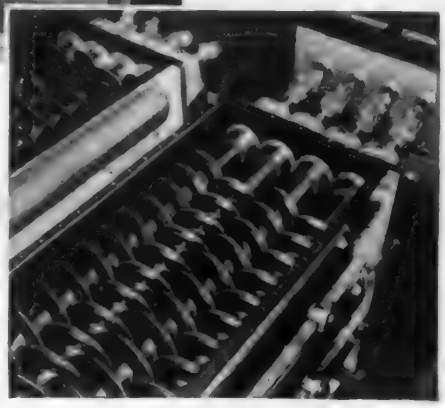

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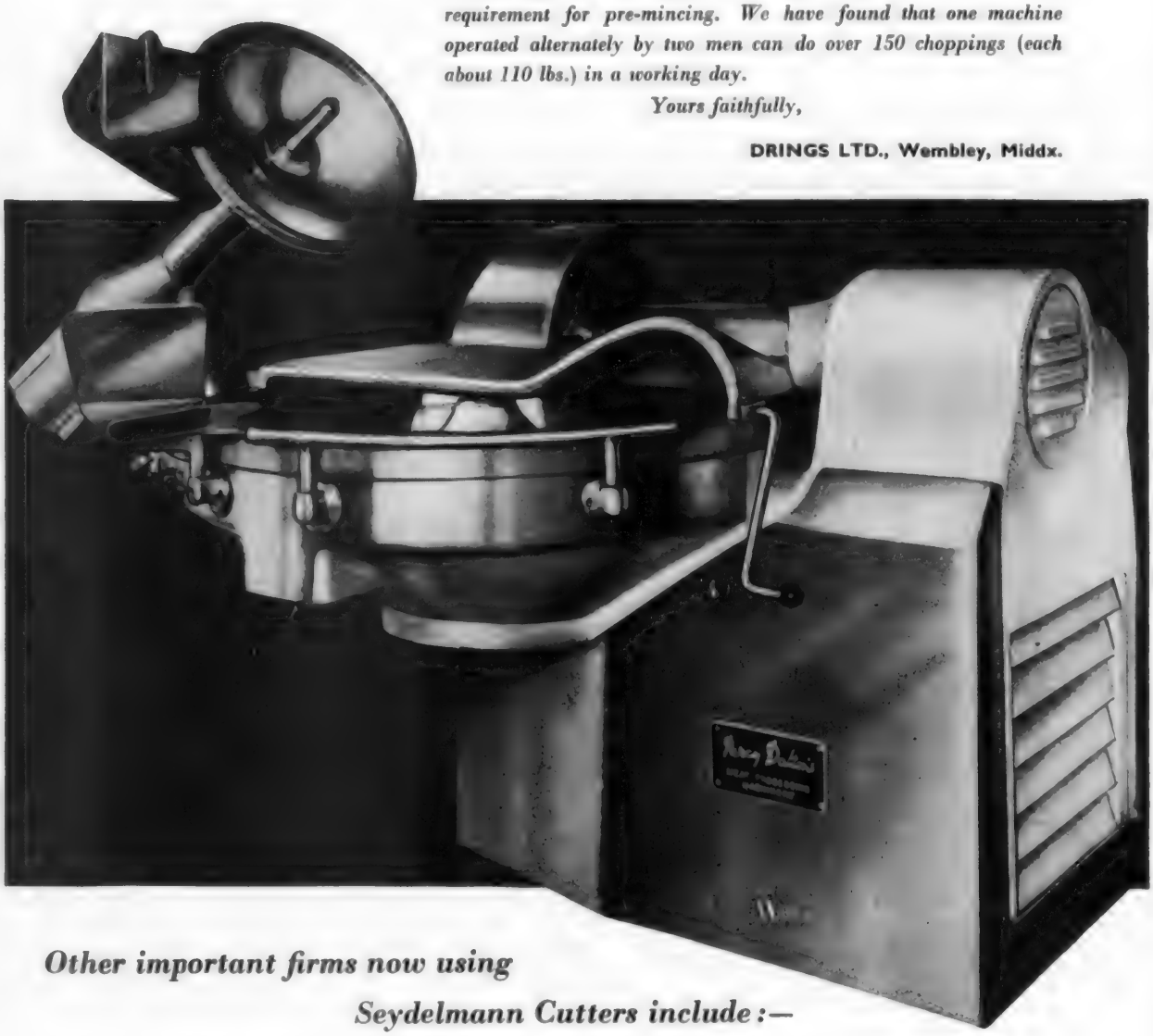

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FOOD MANUFACTURE

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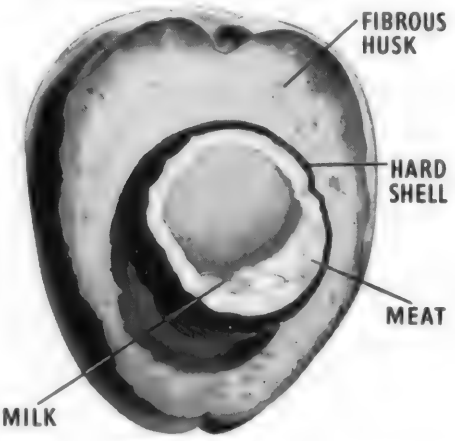
THE COCONUT

The Coconut Palm grows best on alluvial soils under conditions of high temperature and rainfall, thus its cultivation is limited to the coastal areas within a relatively narrow belt approximately 20°N. and S. of the equator. This belt stretches roughly across Equatorial Africa and includes Southern India, Ceylon, the Malay Straits, the Philippines, Indonesia, the South Pacific Islands and the West Indies.

The tree itself grows to about 100 to 120 feet at maturity and bears clusters of nuts after 10 years of growth—a mature tree yielding anything from 100 to 200 nuts per year.

The nuts as we know them are covered with a thick fibrous husk which may be removed and made into a number of products such as coconut matting, brushes, etc. In fact the production of this fibre or coir is an important part of the Coconut Industry and certain species of palm are grown solely for this purpose.



COPRA

In the production of Copra the nut is split open and the meat removed. This is then dried in one of three ways, (a) exposure to the sun, (b) over open fires, or (c) inside hot air kilns. Sun drying is the oldest method and, where climatic conditions allow, is capable of producing a very good quality Copra. Smoke drying is usually employed by natives and unless great care is taken the resulting Copra is likely to be scorched, or overdried. The most up-to-date method of drying is by hot air and on some estates very modern kilns have been introduced. By virtue of the fact that with a kiln of this sort the fresh meat is protected from the variations in weather and from open fires, the Copra, and consequently the crude oil, is usually of a higher quality.

Copra from different parts of the world varies slightly in size, shape and appearance and an expert may tell with some degree of certainty from looking at a sample of Copra, from which part of the world it has come and the drying treatment it has received.

The world production of Copra in 1955 was estimated in the region of 3,000,000 tons. In post-war years the Philippine Islands have replaced Indonesia as the most important producing region and the area under cultivation is estimated at some 2¼ million acres. In most producing countries Copra forms one of the major items in the national economy.

OIL CONTENT

The oil content of Copra may vary depending on the area where it has been produced. It can be as low as 64.0% and in the case of Ceylon or West Indies Copra, as high as 70.0%.

The condition of the Copra is reflected in its colour and F.F.A. and depending on the method used in its preparation may vary from off white to a chocolate colour with a Free Fatty Acid content of 0.1% to 7.0%.

The table below shows some of these variations.

Type	Colour	F.F.A. %	Moisture %
Sun Dried			
Good ...	Off White	0·5–2·0	3·3–4·5
Fair ...	Cream/Golden Brown	1·5–2·5	3·3–4·5
Poor ...	Golden Brown/Brown	2·5–4·0	3·3–4·5
Hot Air Dried			
Good ...	Pale Cream	0·8–1·5	3·3–4·5
Fair ...	Cream	1·5–2·5	3·3–4·5
Poor ...	Cream/Brown	2·0–3·0	3·3–4·5
Smoke Dried			
Good ...	Cream/Golden Brown /Brown	1·0–2·5	3·5–4·2
Fair ...	Brown/Chocolate	2·0–3·0	3·5–4·2
Poor ...	Chocolate	3·0–4·5	3·5–4·2

These figures are typical and not necessarily average.

LN 43-725

FOOD MANUFACTURE

Vol. XXXIII, No. 9 September 1, 1958

Anti-hunger campaign

DESPITE all the efforts made by such bodies as FAO, WHO, UNESCO and other United Nations' organisations, as well as the increased food production which modern science has brought about, progress in the effort to abolish world hunger has been pitifully slow, and with the present growth of world population, which is expected to double itself by the end of the century, the attainment of reasonably adequate levels of nutrition for hundreds of millions of people remains a distant if not a receding problem.

This rather unhappy, though undoubtedly realistic, view of the food supply position throughout the world was expressed recently by Mr. B. R. Sen, Director-General of FAO. Addressing a meeting of the United Nations' Economic and Social Council (ECOSOC) to which FAO delivered a report, he called for a special year, after the type of the International Geophysical Year, devoted to tackling the problem of world malnutrition. At the same time he reminded the meeting that the problems of poverty, hunger and malnutrition are so vast in scale and so serious in character that no one year's endeavour, however intense, could in itself constitute anything like a fundamental solution, and warned particularly against the use of facile slogans which might have some superficial appeal but would fail entirely to go to the roots of the intricate economic relationships involved—a clear hint that the suggested campaign might be seized upon for propaganda purposes by unscrupulous elements. None the less, he felt that a year in which "we might seek through all the international and other agencies to consciously orientate all means at our disposal to attack this complex problem" would heighten the awareness of the world to the gravity of the problem and "improve the foundations for accelerated and effective action."

The FAO report itself, which deals with the food reserve position in under-developed countries, holds out little hope that the countries most in need of national food reserves will be able to build them up through commercial purchases, and sees the only answer to the problem in the surplus food stocks now existing in some countries. It suggests that the making available of these stocks to poorer countries for reserve purposes need not conflict with the interests of other exporting countries, since the use of the stocks as a reservoir against emergency conditions would not reduce the volume of current consumption or of traditional imports. The report notes that generous provisions already exist under United States' legislation, the Colombo Plan, and other forms of external help, for the use of such stocks in emergencies abroad, but points out that a number of difficulties, the solution of which is imperative, have up to now precluded any major transfer of stocks for the consistent building up of national reserves.

Food for thought

WE have commented several times on the dangers arising from atomic explosions and the contamination of the world's food supplies with radio-active fallout. A sombre warning has now been given by the United Nations' committee of 83 leading scientists from 15 countries who have been studying radiation hazards for two and a half years. The committee has reached the solemn conclusion that no one knows how much damage may be being done by the radiation to which we are all being subjected, but that thousands have already been condemned by H-bomb tests to illness, deformity or death. It also draws attention to the dangers arising from atomic power stations, therapeutic and diagnostic X-rays and other sources of radiation.

The report reveals that radiation in certain areas of the world has already risen above the level which the Medical Research Council has suggested deserves "serious consideration." It is true that even in countries where exposure to man-made radiations is greatest, these have not yet exceeded 2% of the background level. But the report also reveals just how the materials responsible for radiation can become concentrated in our food. Pointing out that strontium 90, which is deposited along with calcium in many foods, accumulates more in rice, other cereals, and vegetables generally even than it does in milk, the report shows that the rice-eating populations of many Far Eastern countries are consuming about six times as much strontium 90 as the milk-drinking people of the West. Canada, with a

big consumption of cereals, also has a higher-than-average strontium intake. This, be it said, does not necessarily mean that the dangers arising from the consumption of this material in milk have been exaggerated; it merely means that even more vigorous concentrators of the element have been found.

Perhaps the most significant feature about the report is the fact that scientists from Russia and Czechoslovakia, from Britain and the U.S.A., as well as from many other nations, committed and uncommitted in their support of the rival doctrines, have co-operated in its production, and in issuing the warnings it contains. When scientists are united, can governments be far behind?

Ten times round the world

ONE of the notable facts about the post-war eating habits of the British people has been the striking increase in the number of sausages consumed. Stimulated, no doubt, by the war-time shortage of meat, and further enhanced by today's general demand for quickly cooked or ready-to-eat foods, the sausage-eating habit has grown to such an extent that we are now consuming sausages to the value of £90 million per year. Speaking at a recent meeting of the Meat and Fish Products Panel of the British Food Manufacturing Industries Research Association, Mr. R. Marshall, head of the Technical Development section of the Oppenheimer Casing Co. (U.K.), Ltd., said that in 1957 no less than 4,500 million sausages were eaten in Britain, the equivalent of 1 sausage every 4 days per head of population, or enough, placed end to end, to stretch 10 times round the world.

Mr. Marshall was addressing the panel on the subject of sausage casings, which he dealt with under the heading of natural and synthetic. He said that in this country beef casings were used mainly for black puddings, for which their natural curvature is suitable, since we appeared to prefer synthetic casings for our breakfast-type sausages. He drew attention to the fact, however, that Continental people, particularly the Germans, prefer natural casings for this type of commodity, so that a ready export market for beef casings exists.

On the subject of synthetic casings, he pointed out that there now exist synthetic casings for every type of sausage produced in Britain except the normal 6 or 8 to the pound beef or pork type, for which hog casings are still used. Cellulose casings, which are non-edible, are used mainly in the manufacture of skinless sausages, whilst alginate casings are used extensively in the sausage-canning industry.

Many firms now distribute sausages on a nation-wide scale, and with its canned and skinless forms increasing in popularity, many thousands of pounds being spent on research into ways of improving its flavour and increasing its keeping qualities, and public analysts keeping a wary eye on its meat content, the humble "banger" has now become big business.

Pest infestation control

ONE of the major problems of controlling the pest infestation of imported foodstuffs lies in controlling the infestation at source. If this is not done, much damage is sustained in the overseas producing territories and during transit by sea, and the infestation may have reached uncontrollable proportions before the commodity ever reaches this country. In order that this infestation should be more efficiently controlled in its early stages, the Pest Infestation Research Board has recommended to the D.S.I.R. that the Pest Control Laboratory should extend its research to cover infestation of food during storage and handling on board ships and overseas. The recommendation is included in the Board's proposals for the 5-year period beginning next year, and appears in its annual report.

This scheme, if adopted, will not represent a completely new venture, since for some years the laboratory has maintained close contact, through its Colonial Liaison Officer, with food storage problems in many Colonial territories. In fact, some of the laboratory's senior scientists have been asked by Colonial governments to investigate and advise on specific problems.

Another extremely serious problem to which the report draws attention is the development by insects of resistance to insecticides. The Research Board considers that work on this problem should be given the highest priority, and reports that the World Health Organisation has given the project strong support, and has offered very substantial financial assistance to the laboratory in aid of the biochemical research involved.

Changing patterns of distribution

THE phenomenal growth during the last three years or so of self-service grocery stores, some of them now approaching the American super-markets in size and many of them owned by large chains, has been commented upon in these columns several times. Small individual grocers have naturally become extremely concerned about these developments, and have recently been particularly incensed at the growing practice in these multiple stores of price-cutting on certain selected items. Many small grocers have feared that this practice heralds a return of the price-cutting wars of the thirties, and have urged manufacturers to enforce the recommended prices of

their products, even to the extent of a threat, now withdrawn, to boycott manufacturers who do not do so.

The concern of the smaller traders is natural enough, to say the least of it, as is the reluctance of manufacturers to forgo the increased outlet for his goods which the multiple concerns, selling at reduced prices, can offer him. The practice of selling one article at a reduced price to attract trade in other goods is probably as old as trade itself, however, and as is pointed out in a recent article in the *Financial Times*, the practice need not be considered as militating in all cases against the interests of the smaller man. As the article comments, it is entirely falacious to believe that super-markets have lower mark-ups and margins than other shops, for it is doubtful, with the capital expenditure involved, whether any of them could operate profitably at a lower average mark-up than is considered necessary by the individual trader (a figure given in the article as 16%). They therefore depend on making up through the extra trade they draw on other goods the profits they lose on their cut-price lines. The cut prices draw customers into the shop, who stay to spend more expansively. It is suggested that this system of "flexible pricing" is equally available to the small trader, and will indeed become common practice among all the most efficient of them.

Voluntary buying chains

Another way in which the smaller men are able to combat the competition of the larger groups is by the formation of voluntary wholesaling associations, which link the trader to one particular wholesaler, giving him advantages in discounts, credit facilities, and organisational advice. The first of these voluntary buying chains, the Alliance of Individual Grocers, was formed in 1954, and there are now at least 46 such groups in the country, covering some 8,000 shops—about 10% of the private grocers now in business. The grocer receives a discount which may amount in some cases to $2\frac{1}{2}$%. More important, he receives everything from one source, and as weekly, and often twice-weekly, deliveries are made, he needs to carry considerably less stock, which releases capital for improvements in the shop. In America, the voluntary chain will often lend money for these purposes, but so far this has not happened here. Nor has anyone yet introduced a Swedish innovation, wholesale self-service, whereby a retailer collects his goods from a self-service warehouse.

All this affects the food manufacturer not a little. In America, whose distributing and buying patterns we appear to be following increasingly closely, manufacturers are having to fight extremely hard to get their branded goods on the shelves of super-markets in competition with the super-markets' own brands. So far, the chains over here have done little to develop their own brands in competition with nationally known manufacturers. If ever they do, the manufacturers, particularly the smaller ones, will be more than happy to foster the continued existence of the small individual trader.

A £400 million industry

BRITISH industry last year spent upwards of £400 million on packages for its products. Yet many people consider that packaging still does not receive the consideration it deserves as a major factor in production costs and productivity. In a review of productivity in packaging, currently being issued by the British Productivity Council, a general survey is given of what is going on in this sector of industry, and examples are quoted to show how productivity rises and costs come down when packaging is planned for and considered as an integral part of the manufacturing process, and not as a postscript to production.

One of the examples quoted as being typical of the best practice is that of a collapsible tube manufacturer, who has been able to persuade his customers to let him know when they are first considering a new product. This allows him time to perform the many tests necessary to ensure that the best and most economical package is designed. It also allows in certain cases for the product to be designed in some particular to suit the package, rather than the other way round, to the benefit of all concerned. Thus it may be possible by the simple addition of an inhibitor to make the product compatible with a cheaper tube, and a slight alteration in formula can lead to important savings.

Tackling the problem at the earliest stage of all, the Produce Prepackaging Development Association is trying to interest seed suppliers and research organisations in the possibilities of growing produce more suitable for prepackaging than some of the existing varieties.

The review also gives interesting examples of the effect on demand of packaging techniques. Sales of a traditional foodstuff in a novelty package totalled 15 million units in the first nine months, whilst a new and attractive neckband on some bottled products pushed up sales by 18%. In another example, studied in a London self-service store, it was shown that a new package is selling a certain product five times as fast as it sold in a traditional container under precisely similar selling conditions.

As one packager recently put it, "a traditional package is often geared to traditional levels of

sales." The review should make enlightening reading for anyone wedded to this "traditional" outlook, and provide further stimulation for anyone already "package conscious."

Standard for marzipan

A STANDARD for marzipan and almond paste for use in the bakery and similar trades is being suggested by the public health committee of the County Councils Association. The Association has asked the Minister of Agriculture, Fisheries and Food to invite the Food Standards Committee to recommend a standard, with the intention that it should be followed by a Food Standards Order.

The committee says that, in its view, both marzipan and almond paste should contain not less than 25% of ground almonds.

The request to the Minister is being made following a report from the Carmarthenshire County Council, which states that after an adverse report by the public analyst on a sample of almond paste it was learned that discussions were taking place between the bakery trade and the Association of Public Analysts "with a view to securing agreement on a standard (or standards) for marzipan and similar nut products."

The county council was given to understand that discussions had reached a stage when general agreement could be expected shortly.

The report states: "It would appear that the intention was to publish a Code of Practice, as has been done in the case of several other articles of food, stipulating an agreed standard or standards. This we consider to be far from satisfactory.

"Such matters of importance to food and drugs authorities could be dealt with more adequately by reference to the food standards committee of the Ministry as a subject for an Order to be made by the Minister.

"Codes of Practice generally seek to offer advice and guidance whereas we consider that standards of quality and composition should be legally enforceable.

"In connection with marzipan, almond and other nut pastes, certain points which merit careful consideration occur to us. The discussions mentioned above seem to indicate that:

"(1) Marzipan is to be given a standard on its own of 25% ground almonds content, which, having regard to the fact that marzipan is a mixture mainly of ground almonds and sugar, is rather low. It appears that different analysts employ different methods and bases of calculation, which can produce very appreciable differences in the final figures.

"(2) It seems that it is proposed to set a lower standard for almond paste and other nut pastes. We contend that marzipan and almond pastes are synonymous and feel sure that housewives generally and public analysts would concur. It is submitted therefore that the same standard should apply to marzipan and almond paste.

"(3) Other nuts have a lower oil content than almonds and these other nut pastes are very much less in demand than almond paste and should be considered separately, if at all."

Ion-exchange resins in molasses processing

THE instability of ion-exchange resins and inadequate knowledge of their properties restricted, until lately, the range of their industrial application. However, new developments give promise of much wider applications in the future, as can be seen from the introduction of ion-exchange techniques into sugar manufacture, where previous attempts to demineralise sugar by these techniques had to be abandoned because the ion exchangers in use at that time could not stand up to prolonged use in the presence of sugar juice and lost their potency. However, with the advent of synthetic exchangers, the situation was changed.

The possibility of further applications for ion-exchange resins is discussed by D. Bourguignat in *Chimie & Industrie*, 1958, **79** (4), 439-443, where he describes experiments on the treatment of molasses —a material that is particularly "rough" on ion-exchangers. In these experiments, an installation capable of treating 1 metric ton per day of molasses was operated for 24 hours a day for over six months. The ion-exchange properties of the exchangers did not deteriorate and the stability of the resins was concluded to be completely satisfactory. Sugar was obtained regularly, at the outlet, in the form of a coloured juice with a concentration of 5 to 7% and a purity of 92 to 95%. A trial boiling carried out on this juice made it possible to obtain a commercially satisfactory crystallised product.

Observations made in the course of these and previous studies now make it possible to employ ion exchangers safely in very complicated organic media. It should be appreciated that, from the point of view of complexity, molasses is a particularly well chosen example. After the dilution of the molasses, precipitations form which have the tendency to clog the exchangers, but the techniques developed in these experiments made it possible to overcome this drawback, and to obtain, by simple filtration, a whole series of compounds in a more or less pure state.

M. Bourguignat concludes that it is possible to envisage the application of ion exchangers over a very wide field, including glycerine, glycol, syrups and various organic products.

The Morecambe Bay Potted Shrimp Industry

By Elliot B. Dewberry, M.B.E., F.R.S.H., F.R.I.P.H. & H.

Not all the British food industry consists of large companies with factories throughout the country. Many smaller firms still flourish, and the standards of hygiene and quality demanded of them are now just as high as those required of the larger concerns. In this article, the author describes an old cottage industry in Lancashire on behalf of which the Food Hygiene Regulations, 1955, were recently modified, enabling it still to hold its place in the production of the nation's food.

THE potted shrimp industry was founded and registered under the Industrial Provident Securities Act, in 1919, by the Morecambe Trawlers Ltd. The premises were partially reconstructed in 1949, when up-to-date equipment was installed, and in 1954 a deep-freeze room was added. The season for potting shrimps lasts from May to October.

Catching the shrimps

The species of shrimp (*Crangon vulgaris*, Linn.), which is utilised in the above industry, is about 1½ to 2 in. in length, greyish brown in colour with brown markings, turning shiny brown when boiled. The shrimps are caught by motor trawlers about 3 to 4 miles out to sea in Morecambe Bay and vicinity, at a depth of about 30 fathoms. Trawling is controlled by the Bye-laws of the Lancashire and Western Sea Fisheries District Committee. The accompanying table shows the weight and value of the catch over the last 3 years.

On board the trawler the catch is carefully riddled to eliminate small fish, etc., and the shrimps boiled in sea water for about 15 to 20 min., then drained and placed in netting bags. The catch is landed on the jetty a few hours afterwards and transported to the factory, which is situated a few hundred yards distant, where it is roughly weighed and recorded.

Characteristics

Fresh shrimps emit a not unpleasant smell, the tails are turned inwards and pressed firmly against their bodies. Shells are clean looking, with a crisp feel, eyes clear and prominent.

The newly caught shrimps are riddled to remove unwanted material.

The chemical composition of the shrimp is as follows:

Water	...	70·80%
Protein	...	25·40%
Fat ...	...	1·00%
Carbohydrates		0·20%
Ash ...	...	2·60%

Iodine and vitamins A and B are also present. Energy value of shrimp meat is 1092 calories per kilo (495 calories per pound).

Shelling the shrimps

The shelling or picking of the shrimps is done for the firm by outworkers in their domestic premises. This is a traditional cottage industry and has been in existence for many years, and it affords employment for a considerable number of persons. The work, which requires considerable practice and dexterity, is carried out by women, many of whom are elderly and would be unfitted for real factory work. Moreover, the catches of shrimps are landed at various times during the day, and regular factory hours could consequently not be worked.

In 1924, a local byelaw passed by the Borough Council of Morecambe and Heysham made registration of the outworkers' premises compulsory, and regular inspections have since been made by the representatives of the local Public Health Authority.

A considerable amount of publicity has been given to the employment of these shrimp pickers during the past two years, owing to the introduction in 1955 of the Food Hygiene Regulations, which forbade the giving out of shrimps to workers to be shelled in their domestic premises. The matter was reconsidered, however, as it was not considered practical to change the arrangements in the immediate future without severe dislocation to the industry. Accordingly, amendments to the regulations were made in December, 1957, whereby the shelling of shrimps by outworkers would not be allowed after June 1, 1958, unless their premises were registered with the local authority. In addition, certain requirements contained in the Food Hygiene Regulations now have to be complied with. The person responsible for giving out the shrimps must assure himself periodically that the outworkers can comply with the above requirements and must notify the local authority accordingly. The whole matter is to be reviewed again at the end of 1959.

It would appear that at the present time there is no satisfac-

The shrimps are peeled by outworkers, working in their own domestic premises.

tory machinery available in this country for shelling shrimps, but it is understood that research on the matter is being carried out.

At the factory of Morecambe Trawlers Ltd., the shrimps required to be shelled are weighed, placed in covered stainless steel receptacles, and handed over to the outworkers for conveyance to their domestic premises. Here, the women pickers, wearing washable overalls and head coverings, and seated at tables having removable impermeable coverings, are given the receptacles containing the shrimps. Enamelled or polythene bowls, with covers, are used to receive the shelled meats. The waste materials ("sloughs," i.e., heads, tails, etc.) are deposited in enamelled buckets.

The shelling procedure is as follows: The head and most of the body of the shrimp is grasped between the thumb and finger of the left hand, the hindquarters being held by the thumb and finger of the right hand. The shell covering the hindquarters is removed from the remaining portion of the body and discarded, leaving the meat protruding. The latter is then drawn out, using slight pressure with the thumb and finger of the left hand, and deposited in the allotted bowl. A skilled worker can shell 35 shrimps per min. or about 1½ lb. per hr.

Samples are taken from the tables periodically by the Public Health Inspector for bacteriological examination. On completion of the above process the covered receptacles containing the meats are returned to the factory where they are weighed and booked to the outworkers for payment.

The waste materials (shells, head, tails, etc.) are collected daily by the Corporation Cleansing Department and removed to the processing plant to be converted into fish food or fertiliser.

Processing the meat

The shrimp meat is cleansed in running water and afterwards placed in sterilised stainless steel trays and stored temporarily in the cooling room (at 32°F.) till required for use. When supplies of shrimp meat are plentiful, during the season, the surplus is quick frozen and stored in the deep-freeze room at −6°F. This is necessary so that supplies are available during the off-season, viz., January to March.

The batches of shrimp meat, to which 1 lb. of butter is added to every 10 lb., together with a suitable quantity of blended spices, are placed in deep enamelled-lined boiling pans with covers, each holding about 60 lb. The range of pans is encased in stainless steel and heated by gas burners. The covers are suspended and can be lowered on to the pans as required. Heat is applied for about 35 min. to bring the contents gradually to boiling point, and this temperature is maintained for a further 20 min., during which time the batch is stirred frequently. On completion it is strained in oblong wire-mesh baskets to remove any surplus liquid and afterwards placed in sterilised stainless-steel trays and conveyed to the cooling chamber for 15 min. to bring it back to normal temperature. This

The cartons are filled by hand, and each is adjusted to a net weight of exactly 2 oz.

The filling and cooking room, showing the enamel-lined cooking pans in the background. Nearly all the equipment is of stainless steel.

Table I. Weight and value of shrimps landed in Morecambe Bay during the last three years.

Year	Cwts	Value
1955	1,510	£7,559
1956	2,088	£10,456
1957	1,806	£9,101

removes greasiness and facilitates examination for the removal of any stray pieces of shell, etc.

The material is then transferred by hand, using aluminium alloy scoops, to greaseproof, labelled wax cartons, and each carton is weighed to contain exactly 2 oz. A sufficient quantity of melted butter is then poured on to seal the potted shrimps. When this has set, a cellophane disc is placed over the butter and the printed lid is pressed on by hand. This is the standard Morecambe Trawlers Ltd. pack, with the trade name "The Catches." In some instances customers supply their own printed wax cartons to the factory for filling.

The cartons are packed in quantities of 1 doz. upwards in cardboard outers, bound with steel strapping. An average size would contain 10 doz. 2 oz. cartons.

The factory is periodically inspected by the Public Health Inspector of the Local Authority under the Food and Drug Act and Food Hygiene Regulations and sample cartons of the potted shrimps are taken from stock for bacteriological examination.

World Fruit Trade

A NEW edition has recently appeared of the *Fruit Annual*,* covering the years 1957-1958. In the editorial section, a chapter is included on mechanisation in fruit growing, processing and packing, and a reference section on the processing and canning of fruits and nuts has also been prepared. This lists various fruits alphabetically, giving details of the processes available for their preservation, with processing times and temperatures where appropriate, and contains much useful technical data. The book also contains a world survey of production and trade, and a world directory of traders in fruit and fruit products, as well as a guide to fruit shippers and the services they have available.

* *The Fruit Annual*, 1957-1958. British-Continental Trade Press, Ltd., London. Pp. 632. 60s. net.

I.S.I.S.
Technical Enquiry Service

Owing to the general rise in costs and the difficulty of providing adequate specialised staff it is no longer possible for us to answer technical enquiries free of charge. In future all technical—not commercial or "where-to-buy" — enquiries will be referred to our associated company, Isis (Industrial and Scientific Information Service, Ltd.) which operates from Leonard Hill House, Eden Street, London, N.W.1. Isis is directed by an Information Officer who is a graduate chemist (Ph.D.) with industrial and research experience and a wide knowledge of information sources. If the enquiry is of the type that can be answered by the Service a fee will be quoted before work is put in hand. Fees will be on a moderate scale directly related to the amount of work required. The Service is in no way competitive with the work of Consulting Chemists and Engineers. Enquiries requiring the judgment and resources of Consultants will be answered by supplying the names of suitable experts, for which information no fee will be charged.

Commercial, "where-to-buy" enquiries will as hitherto be answered free of charge.

Enquiries of both types are welcomed. We hope our readers will make the fullest use of our Service.

▶ The practical properties of induction and dielectric heating are described in No. 6 in the *Electricity and Productivity* series of books published by the British Electrical Development Association. The books consists of 190 pages and 154 illustrations and can be obtained from Electricity Boards or from the E.D.A. 2, Savoy Hill, London, W.C.2, at 8s. 6d. net.

ULTRASONICS
In Food Manufacture

By John S. Smith*

Ultrasonic homogenisation is one of the newer techniques now giving valuable aid to many food processors. In this article a description is given of the principles and practical application of the ultrasonic homogeniser.

SINCE the earliest experimental work on sound energy beyond human audibility, the possibility of employing ultrasonics for emulsification and dispersion has been appreciated. Experiments by many workers[1] since the classic work by Wood and Loomis[2] in 1927 have amply proved the tremendous potentialities of cavitation forces in the field of liquid/liquid and liquid/solid processing. The main deterrent to the widespread adoption of ultrasonic technique has always been the cost factor. Electronic equipment necessary to drive piezoelectric and magnetostrictive transducers has always been expensive, and because these were the only available system little practical use was made of the knowledge gained.

The most important developments in liquid processing by ultrasonics have been in the use of liquid whistles based upon original work carried out in Germany.[3] In 1952, Cottell and Goodman[4] introduced in this country the first commercial equipment employing a liquid whistle. This device, the *Rapisonic* homogeniser (Fig. 1) was the first industrial unit which made liquid processing by ultrasonics possible at an economical figure. Because of its efficiency and low cost this unit was immediately adopted by the food industry and many others throughout the world. Continuous research and development, based upon six years of industrial experience by its manufacturers, has produced a range of machines capable of dealing with a wide variety of applications.

Fig. 1. (*right*). **The Rapisonic homogeniser.**

Fig. 2 (*below*). **The vibrating element, showing; A—base; B—adjustable jet body; C—jet insert; D—vibrating blade; E—resonant bell.**

It will be advantageous first to describe the principles upon which the *Rapisonic* works. The unit includes a specially designed pump to force the liquid to be processed through the whistle or vibrating element at the correct velocity. The vibrating element (Fig. 2) consists basically of a crossover jet which creates a flat stream of liquid. Accurately positioned in this stream is a blade which is set into vibration by the liquid stream (Fig. 3). While this stream velocity is maintained, the blade will vibrate at its natural frequency which is in the order of 20 kcs/sec. The intensity of acoustic energy so created induces cavitation forces of some 60 tons per sq. in. in the liquid.[5] The construction of the whole vibrating element is simple and robust and only the vibrating blade and jet are subject to wear.

Considerable progress has been made in overcoming vibrating blade breakage due to metal fatigue encountered in the early

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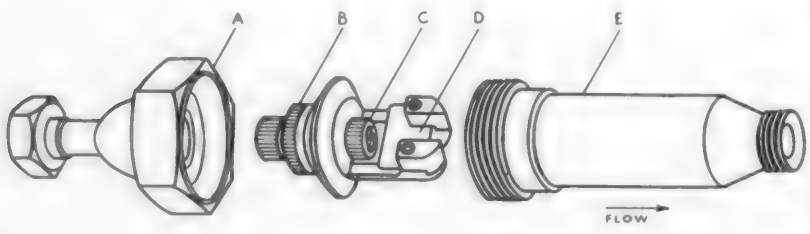


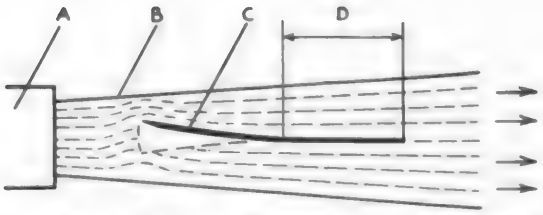


Fig. 3. Diagrammatic section: A—jet; B—liquid stream; C—vibrating blade, showing cavity formed; D—clamped portion of blade.

days on certain heavy substances. The rate of erosion wear on the front edge of the blade is relative to the abrasiveness of the processed liquid; with most food products it is very slight, but it should be checked periodically by visual inspection. Jet wear has been reduced by the use of sintered inserts where slightly abrasive substances are handled. Standard units are suitable for a fairly wide viscosity range but for very high viscosities, special versions are available. To meet the required standards of hygiene, all parts in contact with the liquid are of 18/8/3 stainless steel (which is also highly resistant to chemical attack) on standard units. In the case of the larger, tailor-made equipment alternative materials are often used to reduce the cost.

The purpose of this article is to discuss a number of well established uses of this equipment in the food industry and some of its as yet undeveloped possibilities. The information is of a general nature only, avoiding the disclosure of data which is regarded as confidential between equipment manufacturer and clients.

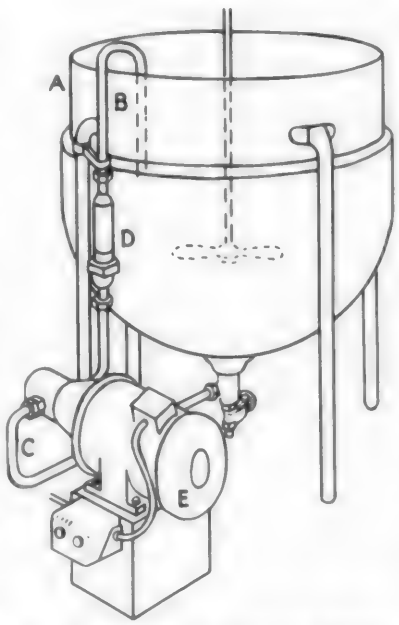


Fig. 4. In this and subsequent illustrations, examples are shown of typical arrangements for using the homogeniser. Above is shown a lay-out for the preparation of soups. A—kettle; B—discharge pipe; C—suction pipe; D—Rapisonic vibrating element; E—pump unit.

Soups

Fig. 4 shows one of the most frequently used arrangements for the preparation of cream of tomato, cream of mushroom and similar soups. The hot soup is drawn from the kettle and recirculated through the *Rapisonic* for a short period. Accurate quality control of colour and viscosity is possible by regulating the recirculation time and slow stirring is essential to achieve a uniform product. If this is impracticable it is safer to make a definite transfer pass (see Fig. 5) to another kettle. Using the standard unit, a 50-gal. batch can be homogenised in less than 20 min. Although large units are more economical in capital cost, a number of standard units is a better proposition where production requirements vary considerably.

Baby foods

In the manufacture of baby foods, strained vegetables and similar products, an improvement of texture and smoothness can be efficiently achieved using the homogeniser, through which a suitably-strained premix at any convenient heat can be passed from one vessel to another. If the breakdown is insufficient, a further pass can be given, or a short recirculation period may be necessary.

Dried milk

Dispersing dried milk for ice cream, chocolate fillings and many other uses has long been accounted a difficult problem. A special unit, the *Rapisonic for Dispersions*, enables fine dispersions to be produced quickly and without heavy maintenance costs. A rough premix of the powder and hot water is poured into the funnel of the unit and one pass is usually adequate. For larger batches, stirring of the premix is necessary to prevent settling out. Cleaning is quick and simple—either hot water or a steam blast can be used.

Essential oils

In the growing rise in popularity of soft drinks the *Rapisonic* has played its part in providing for the manufacture a convenient method of producing a range of essential oil emulsions. The problem has always been to control the particle size within the desired limits. In some cases, particularly in those countries whose regulations prohibit the use of brominated oils, it is necessary to have a final par-

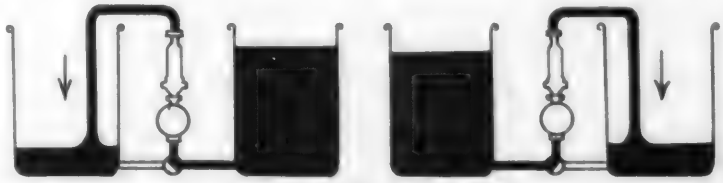


Fig. 5. Layout when two tanks are used, showing first pass and reverse pass.

ticle size of 1-2 microns, otherwise the emulsion is insufficiently stable. In other cases, slightly larger particles of 2-4 microns are desirable to retain the clouding characteristics of the emulsion. These can often be achieved satisfactorily using high pressure homogenisers, but the higher output rate possible using ultrasonic technique is particularly attractive in such a seasonal trade. The *Rapisonic* is usually mounted on a specially designed trolley (Fig. 6) so that it can be moved around the factory from vessel to vessel. Another disadvantage with high pressure homogenisers on this type of product is the heavy wear on the valves due to the presence of silica from the gum acacia. The ultrasonic homogeniser operates on a comparatively low pressure and abrasion is therefore reduced. An alternative arrangement very convenient for smaller batches is shown in Fig. 7.

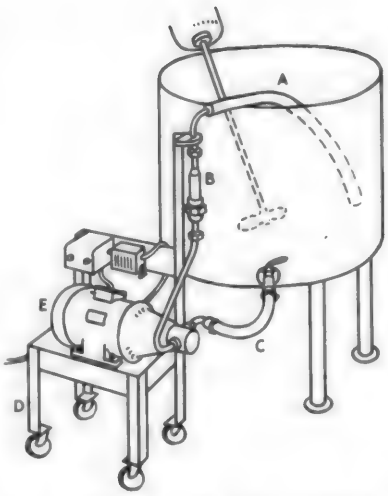


Fig. 6. Use in soft drinks, showing mobile trolley. A—delivery hose; B—vibrating element; C—suction hose; D—fabricated trolley; E—pump unit.

Salad cream

In the large scale production of salad dressing, efficient homogenisation obviates many separation difficulties. It has also proved useful in breaking down the stabilising gums or starches more finely, thereby making the viscosity of the finished dressing more consistent from batch to batch. Materials of this type can be homogenised on a standard *Rapisonic*, but certain changes in the materials used in the construction of the pump are desirable to combat the corrosive action of common salt.

Ice cream

In the making of ice cream on a large continuous scale, or in small batches, ultrasonic homogenisation has much to offer. In both cases the speed and simplicity of the system is very attractive. For large scale work, it can be easily adapted to match the desired flow rate through the cooler, and particle size can be controlled to the required standard. Larger units are available with outputs up to 1,000 gal. per hr., and because of their compactness and comparative lightness in weight they are extremely versatile in installation. Maintenance of these units has been considerably reduced by careful choice of metals and by the use of isolated ball-bearing journals in the integral pump.

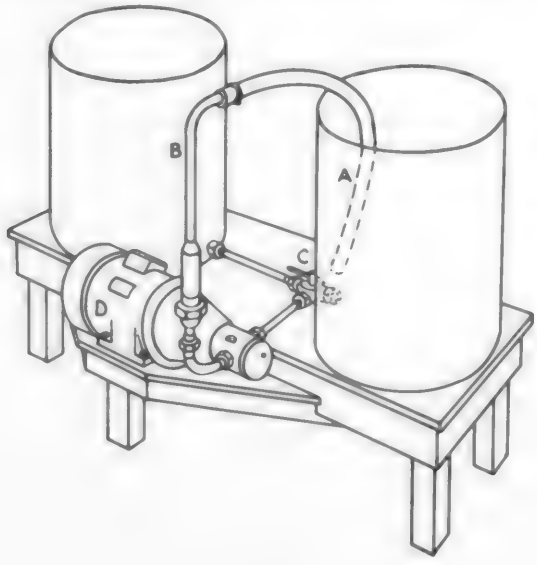


Fig. 7. Alternative arrangement using two tanks. A—delivery hose; B—delivery pipe; C—3-way full-bore valve; D—homogeniser.

Chocolate

Whilst very much experimental work has yet to be done before "conching" ultrasonically is an industrial possibility, blending and texture improvement of couverture chocolate by ultrasonics shows a considerable advantage over older methods. This is particularly true where large quantities can be handled on a continuous or semi-continuous basis. The example given (Fig. 8) shows in diagrammatic form two different chocolates metered into the *Rapisonic*, which gives a perfect blend and reduction of the emulsion particle size with a throughput of approximately 60 lb. per min. The whole unit can be jacketed while retaining ease of dismantling for inspection and cleaning.

Tomato juices

The effect of ultrasonics upon diluted tomato purée is very interesting. Instead of a gradual settlement and a clear water layer on top, in many cases almost permanent stabilisation occurs, giving an enhanced appearance to the product. The treatment can be given in the hot or cold condition and one pass through the homogeniser suffices.

Pan greases and fat extenders for bakeries

Tighter, smoother emulsions can be achieved if they are homogenised instead of using stirring methods. The slow reversal or "mayonnaise" method often employed, which requires expert supervision, can usually be replaced by a single pass through the *Rapisonic* at a temperature just above the fat melting point. Fig. 9 shows a convenient arrangement for making 5 gal. batches. In many cases the lab-

orious stirring until cold can be dispensed with. With fat extenders, excellent results are obtained in most cases by a single pass. One important advantage of the method is that entrainment of air can be entirely obviated (provided the installation is properly arranged) a desirable feature for many emulsions.

Peanut butter

The attractiveness of peanut butter can be greatly enhanced if oil separation is prevented and the texture is made creamier. Its abrasiveness restricts the use of high pressure homogenisation and there has been great interest in the version of the *Rapisonic* recently developed for peanut butter. This is a unit specifically designed for the purpose and is now well known in Canada and America. One leading manufacturer in Canada was so delighted with the results that he now labels his product "It's smoother! it's ultrasonic!" The equipment is installed to give a single transfer from one vessel to another.

Other applications

Another use, well worth referring to, is the preparation of synthetic creams. In some cases ultrasonically treated creams have failed to whip to the desired degree, though examination has shown excellent particle size and physical properties similar to those of cream made by conventional means. These results are as yet unexplained. The answer probably lies in formulation because certain recipes whip rather better after processing ultrasonically.

In the preparation of tomato ketchup and tomato sauces for canned fish, many manufacturers have found ultrasonic technique advantageous in increasing the viscosity and improving the texture.

It is also possible to speed up the preparation of gum tragacanth dispersions in water and vinegar, which are usually slow processes. In many other gums also rapid gel formation is obtained, for example gum karaya, gum acacia and gelatine. When colloidal solutions

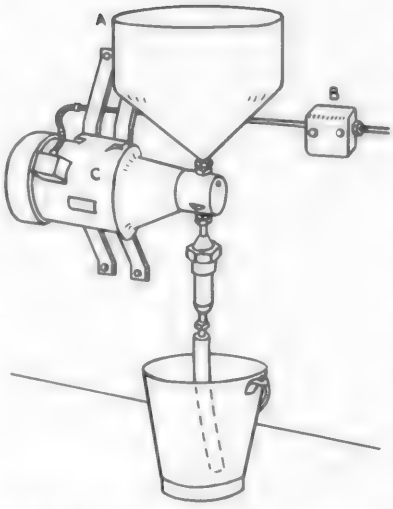


Fig. 9. Use with fats. A—stainless-steel funnel; B—push-button starter; C—homogeniser.

of over 2% sodium alginate are required these can be made instantly and without entraining air, which in concentrated solutions is extremely difficult to remove. Similar time saving is being applied to the gelatinisation of starches which, if heated to the gelling temperature, can be passed immediately through the *Rapisonic*, thus obviating prolonged boiling. The emulsification of margarine was one of the first uses of the unit and excellent results have been obtained, but it has not yet been applied to large scale, continuous production.

Tribute must be paid to the many far-sighted food manufacturers all over the world who were willing to experiment with this new technique in its early days six years ago. Their enterprise has enabled great progress to be made in its development. There remain many problems to be solved. Amongst the interesting possibilities yet unexplored are the fields of toffee and jam manufacture, which have been referred to by several research workers, icing mixes and fillings for confectionery, cheese spreads and cream cheeses, prepared mustards, and cake mixes. Another interesting phenomenon is that of seeding in honeys and invert sugar, where it has been established that under ultrasonic irradiation crystal nuclei are formed resulting in the growth of small crystals throughout the honey.[6] References have been made to applying this phenomenon also to condensed milk.

A smaller version of the *Rapisonic*, the *Minisonic*, for use in laboratories and small batch work, has been on the market for about 3 years. This unit possesses the unique advantage of reproducing almost exactly the results given by the larger machine. The task of formulation in the laboratory is made lighter when these machines are employed, because the number of variants in scaling up to production batches is reduced. It is sold as a "package unit" and is suitable for most emulsification problems.

Ultrasonic methods have been accepted and adopted by the food industry all over the world as the successor to the high pressure piston homogeniser and the colloid mill. But its greatest undeveloped application is that of continuous intimate mixing in a pipeline. Very high quality mixing and blending of a number of liquids on a continuous basis is certainly a field in which little equipment is available at a reasonable outlay. Development work has been in progress for some time on larger or multiple vibrating elements of the

(*Concluded on page 378*)

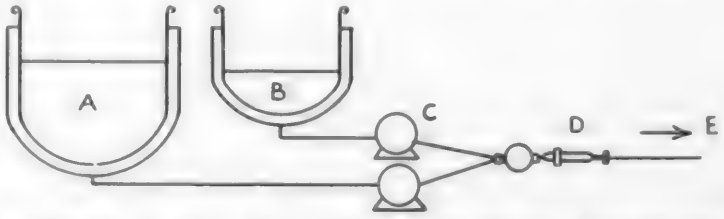
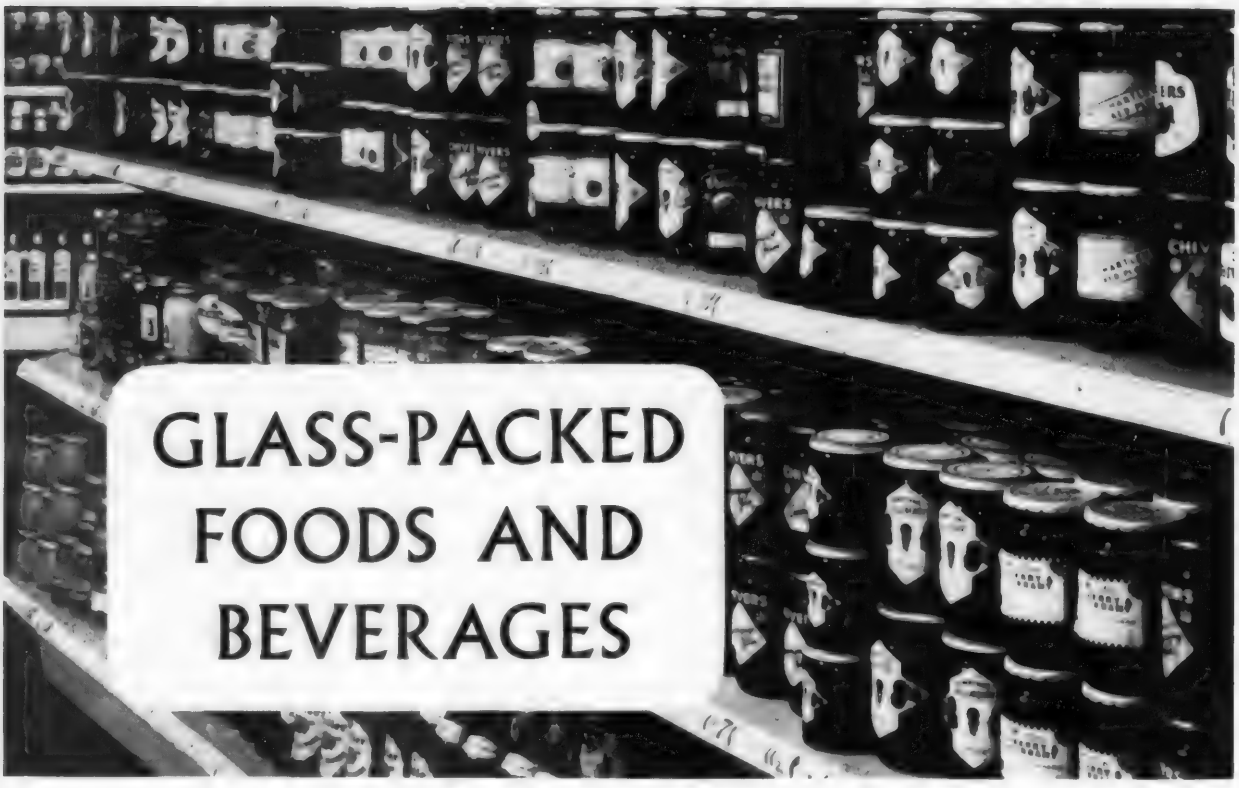


Fig. 8. Blending chocolate or other foods. A—first material; B—second material; C—metering pumps; D—homogeniser; E—blended material.



GLASS-PACKED FOODS AND BEVERAGES

A "FOOD MANUFACTURE" SURVEY

Progress in the Glass Container Industry

By C. E. Weeden*

DURING 1957 over 65% of the 4,000 million bottles and jars produced in Britain went to the food and drink industries. The total figure of 2,645,000 bottles and jars is over twice the number produced for these industries in 1938. This increase in the production of glass containers shows how well the glass industry has kept in step with the phenomenal growth of the food and drink industries.

Since the close of the second world war, the pattern of social life in Britain has changed remarkably. Full employment, and its resultant effect in encouraging married women to go to work, has led to an increased demand for pre-packed produce. The introduction of self-service stores, now increasing in this country at a rate of over 50 a month, shows that retailers are well aware of the necessity of simplifying the purchasing of foodstuffs and of displaying them in such a way as to attract the customer. Thus, in the new pattern of British life, the manufacturers of foodstuffs and packaging materials, and the retailer, are partners, and co-operation between them is vital.

Glass container production today is a highly mechanised affair. Since the close of the war the movement towards mechanisation, begun just prior to the first world war, has intensified, with the result that practically every bottle and jar made in Britain is produced automatically on high speed machines. Britain is one of the most highly mechanised glass container producing countries in the world.

* Glass Manufacturers' Federation.

Education and the glass industry

The introduction of mechanised processes is not entirely a matter for engineers, although they obviously play a vital role in producing and maintaining intricate machinery for forming bottles and jars and for moving them automatically from one section of the process to another. Glass is made by melting sand, soda ash, limestone and certain other materials at temperatures of over 1,300°C. This gives rise to problems necessitating the advice of the chemist, physicist, fuel technologist and others. Since 1917 we have witnessed the rise of a new profession

—that of glass technology. The first University Training Department for this subject was instituted at the University of Sheffield in 1917. For many years the Department also undertook industrial research, but in 1954 a separate institution, the British Glass Industry Research Association, was established.

The importance of research and the supply of qualified technologists to the glass container industry cannot be over-emphasised. Although glass is one of the oldest packaging materials, there is still much to learn about its nature and the technique by which it can be processed. The results of research, if they are to be applied in the factory, depend on the recruitment of adequately trained staff. The glass industry as a whole recognises that recruitment and the subsequent training of recruits are interlinked. The Department of Glass Technology is the only university department to offer courses of both ordinary and honours degree levels in glass technology; individual companies sponsor students and scholarships are offered by the Worshipful Company of Glass Sellers. A three years' course in applied chemistry (glass technology) at Higher National Diploma level is also available at the technical college in St. Helen's, and this is mainly intended for employees who are unable to undertake university training. Within companies, training and apprenticeship schemes are widely operated for junior technicians and craftsmen and such training usually involves part-time attendance at local training colleges for National Certificates or City and Guilds examinations. These problems the glass industry considers collectively through the education committee of the Glass Manufacturers' Federation.

A range of standard and near-standard jars and bottles, most of which have uses in the food and beverages industries. Manufacturers can effect considerable savings by the use of standard containers.

Container design

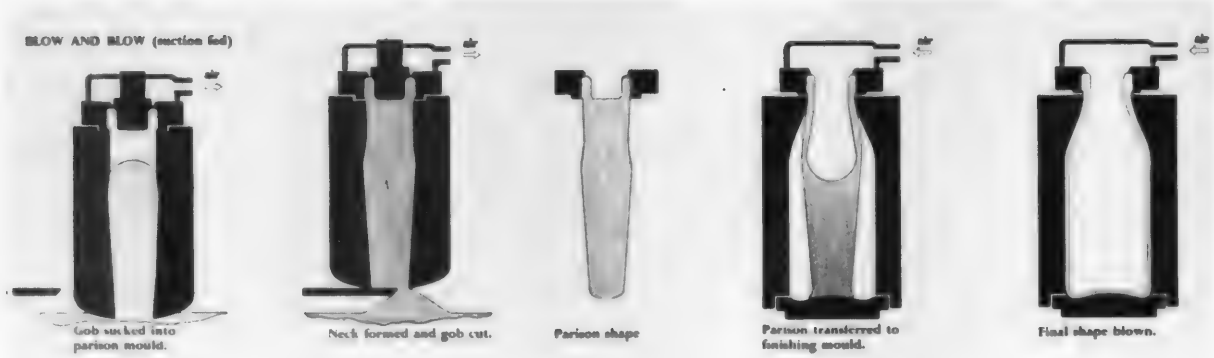
In addition to technical improvements arising from the introduction of machinery and investigation into the science of glass melting, considerable attention has been paid to the design of glass containers. Although this is the subject of a separate article, it is worth recording the benefits that can arise from collective action both within the glass container industry and in conjunction with user organisations. Clearly, developments arising from redesigned standard containers would be unsuccessful were it not for the assistance given by the users of glass and the manufacturers of packaging machinery and closures. The scope of the committee's work has resulted in permanent relationship with many other trade associations and the atmosphere fostered at these joint meetings has been of the greatest use both to users and manufacturers of glass containers.

Earlier there was a reference to the changing pattern of marketing. Far more attention is paid today to the form of the pack and the nature of the material for packaging. Many new materials are now competing with the established packaging materials such as glass, tinplate and paper. The effect of such development can be seen in the interest shown in the work of organisations such as the Printing, Packaging and Allied Trades Research Association and the more recently introduced Produce Prepackaging Development Association.

The rise of new materials often leads to the question as to whether they are affecting the production of glass bottles and jars. It is true that, measured in percentages, the growth of some of the new packaging materials has been phenomenal. But increases in production are relative and a small increase in a well-established industry is often more significant than a large increase in a new industry, and the glass container industry has increased its production by one-third in the past 10 years.

Reducing breakages

Reference has already been made to manufacturing processes, to the selection and melting of raw materials and to the design of glass containers. There are other fields in which investigation is as important. The growth of high-speed packaging lines requires close control over the tolerances to which bottles and jars are made. The speed with which bottles and jars are capped or crowned necessitates an accurate finish. The possibility of shock from bottle-to-bottle impact on conveyor belts should be avoided wherever possible, but the danger from such impact can be reduced by attention to shape. Similarly, resistance to thermal shock can be increased by control at the manufacturing stage and by ensuring as


BLOW AND BLOW (suction fed)
Gob sucked into parison mould.
Neck formed and gob cut.
Parison shape
Parison transferred to finishing mould.
Final shape blown.

The principles of the mechanised blowing of containers. Moulds are machined in some cases to an accuracy of one thousandth of an inch.

even a distribution of glass within the container as possible. Silicone treatment has created considerable interest over the past few years. Silicone treatment, it has been claimed, when used externally, reduces surface damage and when used internally enables all of the liquid content to be removed. Recently, the Society of Glass Technology held a symposium on this subject at which a number of lecturers reported on experiments they had undertaken. These papers are shortly to be published in the journal of the society and anticipating this it can, broadly, be said that whilst the claims for silicone treatment are, in most cases, true, there are possible disadvantages which have to be carefully considered. Silicone treatment is a complicated process and further experiment will be necessary before it can be established that such treatment would be beneficial. Since repeated caustic washing destroys the film, it has little value as a treatment for multi-trip bottles.

Advantages of glass

Five thousand years ago the Egyptians trusted their precious perfumes to glass. Today almost every manufacturing industry uses glass bottles and jars in one form and another for its products. The size of the industry in Britain, and its versatility, are such that it can supply food and drink manufacturers with the quantity and variety of bottles and jars they need. If they wish to sell on the attractiveness of their product, then a glass container acts as a shop window, at the same time completely protecting the product that is packed within it. If the manufacturer seeks to sell by means of an attractive label, then these can be printed on paper and attached to a bottle or jar, or silk screened in colour and fired into the glass. Once sealed, the product is perfectly safe; this is achieved by close co-operation between the manufacturers of glass containers and closures. From a housewife's point of view, there is the additional advantage that a glass container can be opened and re-sealed. Advantages such as these are important to all manufacturers of foodstuffs. They have the versatility of assisting a direct sale and enabling quick turnover and when goods are to be exported, they can be stored indefinitely under varying climatic conditions.

Glass Containers and Research

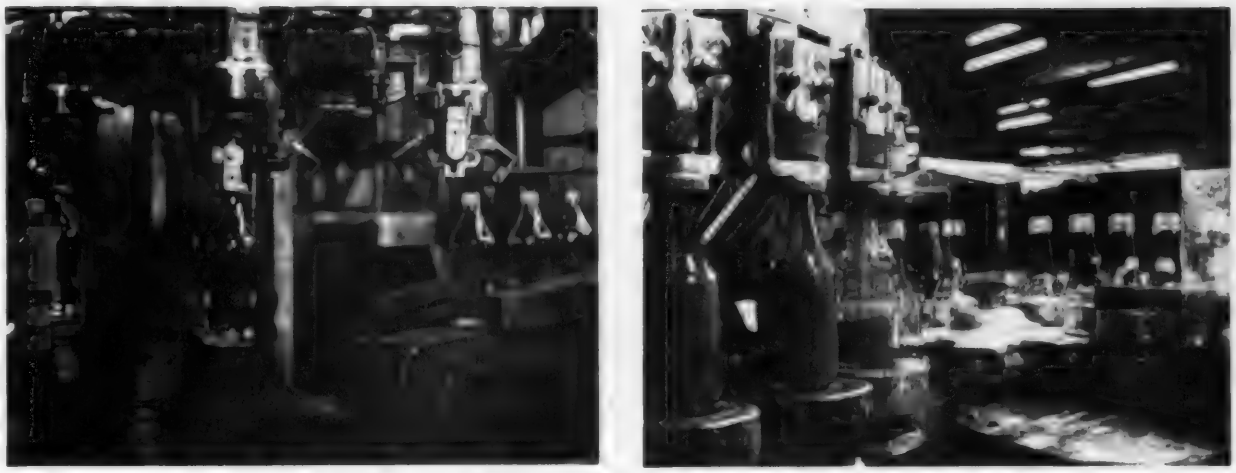
By J. A. Cole*

WHY research into glass containers? Research is admittedly fashionable, and obviously fundamental in new industries producing such innovations as plastics or guided missiles, but glass bottles and jars have been with us for a long time. The Roman glass bottle is clearly a practical job, and in the intervening two thousand years quite a lot of manufacturing experience must have accumulated. What can a research body do which does not evolve naturally in the course of developments in industrial processes and the experience of users?

Sometimes it is useful to formulate the advantages of the familiar, so before discussing research it may be well to review the natural advantages of glass. Why do we continue to use glass as we do, and in fact to an increasing extent, when our age has been so prolific in inventing new substances, including some which can be used for packaging? The answer lies in the physical and chemical properties of glass, which is a very hard and strong substance with a high-reflecting surface "non-greasy" to the touch. Resistant to acids and alkalis (with the one exception of hydrofluoric acid and its compounds), and impermeable to gases and vapours, glass does not absorb odours and it is unfavourable to mould growth or organic contamination. It is versatile, and containers can be made in clear water-white glass (known as white flint), which enables the users to see what is inside, or in various tints to protect the contents from the action of light rays. They can be decorated by enamelling which is fired into the surface of the glass and made permanent.

Broadly speaking, what has made co-ordinated research im-

* Glass Manufacturers' Federation.



On the accuracy with which the bottles are produced (*left*) depends the reliability with which they perform on modern high-speed machinery (*right*).

perative is the necessity to produce at a competitive price containers which can stand up to the kind of handling to which bottles are now subjected, the uses to which they are put, the convenience of those making and using them and, of course, the contribution of the bottle or jar to the attractiveness of the final product when it appears on sale in the shop. Whatever qualities Roman bottles possessed, they were not designed for the exacting ordeal of being filled and capped on a high-speed filling machine, transported in huge masses in a variety of ways, and then of being mechanically washed.

Principles of design

The first requirement, then, is a bottle strong enough to stand handling and, to the required extent, heat. The ideal shape for the strongest container from a given quantity of glass would be a sphere. Spheres being impracticable in handling and storing, they scarcely appear as containers except to hold goldfish, but other shapes are in their different ways adequate. The strongest of these is the cylindrical form with a circular cross-section—an unfamiliar way of describing the everyday round bottle. This type of bottle is twice as strong as the elliptical shape, four times as strong as a square container with rounded corners and ten times as strong as a square one with sharp corners. Note the difference in strength between the square container with rounded corners and the one with sharp corners. What causes this weakness in the sharp-cornered jars is the right-angle junction which produces a "thin spot." Many modern containers avoid this disadvantage by what is called an "inswept junction" which does away with the sharp angle.

The width of the mouth, and to a certain extent the body shape too, are determined by the nature of the contents. The design must accordingly take into account the type of filling machine which will be used, so that there is no constriction in the neck to foul the filling tube or nozzle, and the type of washing machine. For travelling on a fast-moving conveyor a container must be so designed that it does not tumble or knock against other containers. A bottle designer must bear in mind whether the bottle and its contents are to be sterilised or pasteurised. Sufficient expansion space, or vacuity, between the level of the liquid and the stopper is also of vital importance.

All containers have to be made with these considerations in mind. Clearly, it is of advantage to the manufacturer if containers are designed in standardised patterns which incorporate the results of research. Some manufacturers like to have their proprietary design, but owing to the heavy cost of mould equipment and the setting-up of the machine special forms are expensive unless relatively large quantities are ordered. Manufacturers who agree to use standard containers reap all the advantages of long production runs.

Lightweight beer bottles, now increasing rapidly in popularity.

Recent advances

Post-war development has been largely guided by a body called the Glass Container Research Committee which began to operate in 1945 and as a result of whose work many glass containers have been re-designed. One of the first considerations was to reduce the weight of glass bottles and jars without altering their strength and

(*Concluded on page* 378)

Packaging in Glass—

A guide to available equipment

The Purdy Unimatic labeller, described later in this article.

DESPITE the many advances in packaging technique which have been made in post-war years, glass containers still hold pride of place for the packaging of many food commodities. This survey gives a guide to some of the materials and equipment available for the packaging of foods and beverages in glass.

Bottles

An example of the popularity which glass bottles still retain as packaging media is provided by United Glass Bottle Manufacturers, Ltd., who report that in 1955 some 1,750 million units were produced, and that this figure was exceeded progressively in 1956 and 1957, with 1958 well ahead so far. Not all these containers were used in the food industry, of course, but U.G.B. supply large numbers of bottles to the dairy, brewing, and soft drinks industries, and production at their factories continues 24 hr. a day, seven days a week. As well as plain bottles in white flint, amber, green and pale glass, the firm offer decorative bottles suitable for squashes, cordials and other soft drinks. They also make large numbers of bottles with vitreous-coloured labels, screen printed in enamel and permanently fused into the glass. Bottles, labels and designs are produced to customers' own requirements.

U.G.B. also produce lightweight bottles such as have recently been finding increasing acceptance for beer and other beverages, especially for the export trade. With all the company's products, special attention is paid to the requirements of modern, high-speed food production lines, and bottle moulds are machined to an accuracy of one thousandth of an inch. In addition to various quality control departments, the company operates a research department, where customers' problems as well as those arising within the company's own organisation can be examined.

Various containers

Key Glassworks, Ltd., specialise in the manufacture of all types of glass containers for the food, beverage and allied trades. All their glass containers are manufactured on the latest types of fully-automatic glass making machines and particular attention is paid to the quality of all their products. Special consideration is given to the packing of goods in customers' own cartons, which is believed to be greatly in the interest of the packer. All goods are loaded on to pallets and delivered in pallet loads to customers' warehouses so as to facilitate speed of turn round of transport.

Key Glass also enjoy a large and expanding export trade and in many instances the bottles and jars are packed into special printed cartons for their customers overseas to re-use for their own export purposes.

Caps and closures of all types are also supplied.

It was only four years ago that Key Glassworks opened their new and modern factory in Harlow new town, Essex, and to-day they are operating 23 fully automatic machines of the latest type and turning out an average of 50,000 gross of bottles and jars per week.

Messrs. Ronald Gale and Co., Ltd., are the sole selling agents for Key Glassworks, Ltd.

New-look jars

One of the major post-war developments of the long-established firm of J. W. Sutcliffe and Co. (1950), Ltd., has been the introduction of their range of *T.C.* jars. The company decided after the war that it was time that an attempt was made to break away from the conventional shape of jar used for packaging foods, and the attractive but practical range illustrated is the result of this

planning. These jars are designed for their eye appeal, bearing in mind the modern self-service trend, and since their introduction in 1951 many thousands of gross have been manufactured.

Although designed primarily to stimulate sales by their attractive appearance, the jars have the practical advantage of a waisted body, which makes for easier handling. High speed packaging is also facilitated by the "two-point" contact of the jars.

At present these *T.C.* jars are available in sizes ranging from 6-oz. to 16-oz. capacity, and are made in forms suitable either for screw or vacuum caps. They are extensively used for packaging a wide variety of foods, including jam, honey, mincemeat, pickles, beetroot, and horseradish.

Closures

United Glass Bottlers, Ltd., also operate a closures division, Kork-N-Seal, Ltd. The present London and Scottish plants of this company each cover an area of approx. 150,000 sq. ft., and expansion is continuing. Customers are offered a very wide range of tinplate, aluminium, and moulded plastic closures, with liners to suit particular applications, and the company's design and research units are once again at the disposal of customers to study problems and advise on the most suitable sealing techniques.

Salad cream bottles being automatically transferred to the annealing oven at the factory of Key Glassworks, Ltd.

Skirted caps

For some time John Dale, Ltd., have been supplying R.3 shallow and R.4 deep plastic screw caps to fit bottle and jar finishes laid down in the appropriate B.S. Specifications. To this range of caps they have now added a medium deep skirted cap, for which they say there is an increasing demand in this country. This cap is offered in 18, 20, 22, 24, and 28 mm. sizes, and like the R.4 deep cap is designed to screw down over the parison ring of the bottle, whereas the R.3 screws down to the parison ring but does not cover it. The cap is said to offer the advantages of the R.4 closure, and to offer a price advantage because of its reduced depth.

John Dale are also offering their standard plastic peg caps with polythene cone liners in additional sizes to complete the set for 2 oz. to 8 oz. bottles with the R.3 finish. This type of cap is a 2-piece plastic screw closure for bottles and jars, comprising a hard urea peg cap with a polythene cone liner of selected grade. On the inside of the cap there is a perpendicular peg which accepts and locates the hollow polythene cone and retains it in position in the cap. As the cap is screwed on, the cone is first compressed in the bottle neck to create a corking seal on the inside, and then it bends and takes the shape of the bottle, riding out over the top of the lip and providing an air-tight seal.

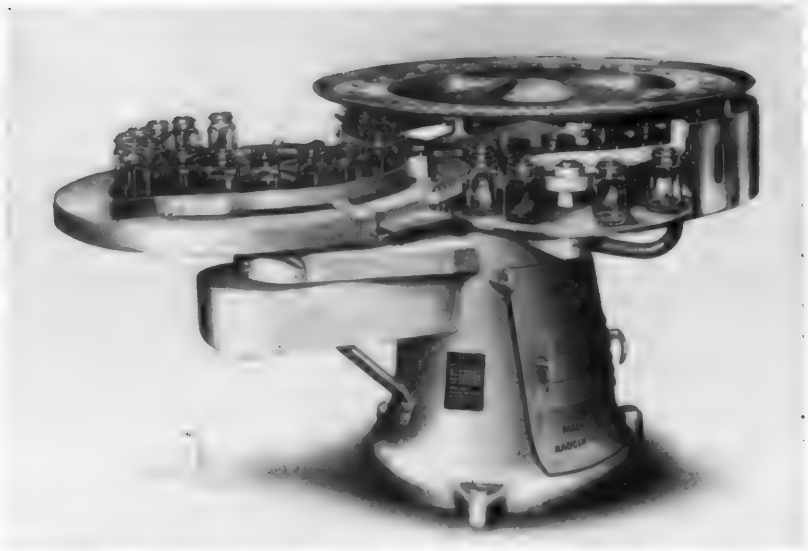
If the bottles are made by modern methods with no vertical fin, the closure is said to prevent all moisture contamination of powders, etc., and thus to obviate the need for shives, plugs, and other subsidiary internal and external seals. It is also claimed that the cap will not ease off as a result of vibration or temperature fluctuations, and can be turned through 120° without the seal being broken.

The cap is now widely used in the pharmaceutical, chemical and cosmetics fields, and is believed to have a wide potential in the squash and beverage trades.

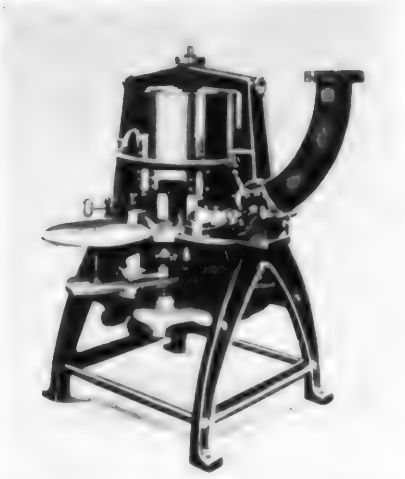
The T.C. series of jars, made by J. W. Sutcliffe and Co. (1950) Ltd.

Rolled-on caps

The *R.O.* (rolled-on) sealing system, by Metal Closures, Ltd., is now very widely used in the food and beverage industries, and has proved its merits over a num-



Mather and Platt's Handpack filler, a unit designed to mechanise as far as possible the filling of plums, strawberries and other solid fruits and vegetables.



The Universal filler, made by Mather and Platt, can handle jams, mincemeat, pickles, and other pasty products.

ber of years. The various types of *R.O.* cap are delivered to the customer without threads, and are rolled on to the bottle during the sealing operation, the threads of the bottle acting as moulds for the formation of threads on the cap. Each cap is thus "tailor-made" to suit the threads of the individual bottle which it closes, and a highly satisfactory seal results. This is said to be truly hermetic, and the *R.O.* seal is claimed to be the only form of screw cap closure which can be applied under vacuum.

Several types of cap are available, and they are supplied either with a beaded skirt or with a *Pilferproof* perforated security band at the base of the skirt, which prevents the pack from being opened without evidence being left that it has been tampered with. The caps are made from pure aluminium sheet, externally finished or decorated in colours to suit the packer's requirements, coated internally and lined with a sealing medium suitable for the contents of the pack and the packing conditions.

Sealing machines

Sealing machines for use with the *R.O.* cap are manufactured by the company and are available on rental terms. Hand operated, semi-automatic and fully-automatic models are available, and speeds of from 900 to 7,500 per hr. can be attained depending on the type of machine used. Bottle heights of from 2 to 12 in. can be accommodated on most models, and cap sizes of up to 70 mm. A vacuum sealing machine is also available.

Fillers

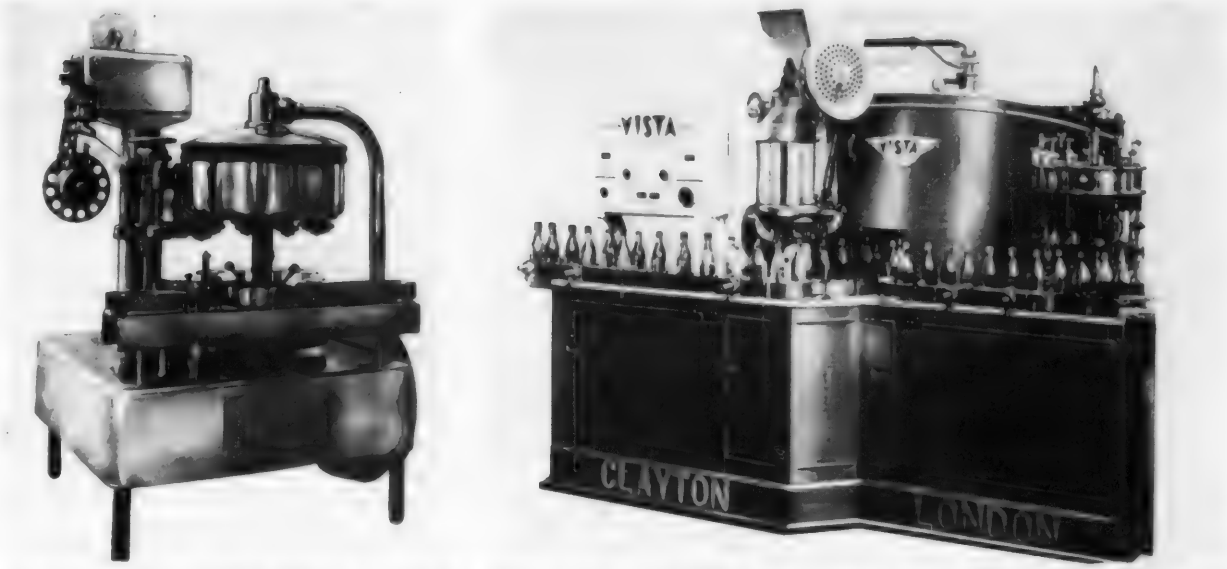
A range of machinery to facilitate the packaging and processing of foods in glass is made by Mather and Platt, Ltd. For the smaller producer, the firm make a hand filler which has been designed to mechanise as far as possible the filling of solid products such as plums, gooseberries, strawberries, carrots, beet, etc., into regular shaped containers such as jam jars. The product is fed, usually by elevator or conveyor, on to the centre of the revolving table. The operators, usually two or three in number, draw the product by hand over the holes arranged around the edge of the table. The product then falls by gravity into the containers which are automatically fed into the starwheel underneath the table. The containers act as their own measuring device and, when full, are discharged by a disc, usually on to a syruper or brineı. Speeds of up to about 100 containers per min. are attainable.

The *Universal* filler, made by the same firm, is a piston type machine suitable for filling a wide range of liquid or pasty products such as jams, pickles, mincemeat or sauces into containers. Its great advantage over certain other types of filling machines is that the product in the tank has full bore entry into the measuring cylinder. A plough assists in the filling of the cylinders when operating on viscous products, and the container, which is timed into the machine from a feed table, can be lifted on to the nozzle, which then slowly descends as the fill proceeds. This avoids the formation of air pockets in the product, an important point with glass packs. On the 6-cylinder model speeds of up to 120 containers per min. are usually obtainable.

The high-speed universal filler is designed for higher speeds of up to 400 containers per min., but is not fitted with a jar lift arrangement. The machine is equipped with 20 measuring cylinders and filling nozzles and is well suited for the higher speed lines in which the product is free flowing and the container of suitable design.

Both these universal fillers are fitted with a no jar-no feed device and are available with either bronze or stainless-steel contact parts.

A third filler made by Mather and Platt, the *Automatic*, is a versatile machine well suited to use with glass packs. The empty con-



Two fillers from the range supplied by George S. Clayton, Ltd. On the left is the 10-head FV filler, with a capacity of up to 4,000 pt. bottles per hr. On the right is shown the 42 Vista syruping, filling and crowning unit.

tainers are fed on to the carriers which carry them under the nozzles on the rotating filling head. The product is supplied to the head by a positive displacement rotary pump unit, the speed of which is adjustable to suit the fill required. The speed of the carrier conveyor is adjustable by means of a second variable speed gear. The adjustment of fill and conveyor speed may thus be carried out without stopping the machine. The machine is particularly suited to the filling of jam, mincemeat, jelly, sauces and similar products. Honey has been filled by arranging for the filling head and the pump unit to be heated. A safety device may be fitted to stop the machine if the jar supply fails. The rotary pump unit can readily be opened for cleaning and can also be used merely as a transfer pump between two parts of the line. Contact parts are usually in bronze.

Jar warmer

Another machine made by Mather and Platt of interest to manufacturers of glass-packed foods is a jar warmer designed to warm glass jars prior to filling with hot product such as jam or jelly, to avoid excessive thermal shock. The glass containers are fed on to a wire mesh conveyor which slowly carries them through a current of hot air produced by a fan and radiator arrangement. The jars are then transferred to the filler either by hand or mechanically by means of a conveyor and timing device. The output may be adjusted to that required by the filler.

Pasteuriser/cooker

Where the product requires pasteurisation, as, for example, a beetroot-in-vinegar pack, or sterilisation, as in the case of a fruit-in-glass pack, the chain type of machine is suitable. This is similar to the well-known single-tier exhausters and the number of runs and, hence the holding capacity, may be made to suit the process required. The stainless-steel diamond type conveyor chain receives the containers from the feed disc and carries them through the water bath, the temperature of which is automatically controlled by instruments. Finally the containers leave the machine over a discharge disc. The variable speed drive incorporated enables the length of the process to be adjusted. The water sealed lids can be removed easily for access to the machine, and the position of the feed and discharge discs are adjustable to suit the layout required. The maximum speed of operation depends upon the design of the container but is usually about 100 jars per min.

Jam jar steriliser

This machine receives the filled jars after capping and passes them through a chamber under the action of live steam sprays. The purpose of the machine is threefold: firstly to "exhaust" the head space in order to produce a vacuum seal on subsequent cooling; secondly to sterilize the top surface of the product and avoid mould growths; and thirdly to give a warm water wash to the filled jars before they are cooled. The steam spray system is fitted with a temperature controller and the washing section has an automatic hot water mixing valve. The conveyor is of stainless steel and the steam consumption is reduced to a minimum by the use of lagging. Complete access is afforded by the easily removable lids.

Bottle packer

Mather and Platt also offer a bottle packer, designed to fill bottles automatically into their crates or boxes. The bottles are fed on to the conveyor consisting

of a number of slat band chains all moving in the same direction. Moving guides divide the bottles into the number of lines required to suit the crate. The crate or box is automatically lifted up to receive the layer of bottles which drop into it through spring guides. In this way speeds of up to 1,800 doz. bottles per hr. may be crated. This machine is particularly applicable to the brewery, milk and soft drink trades.

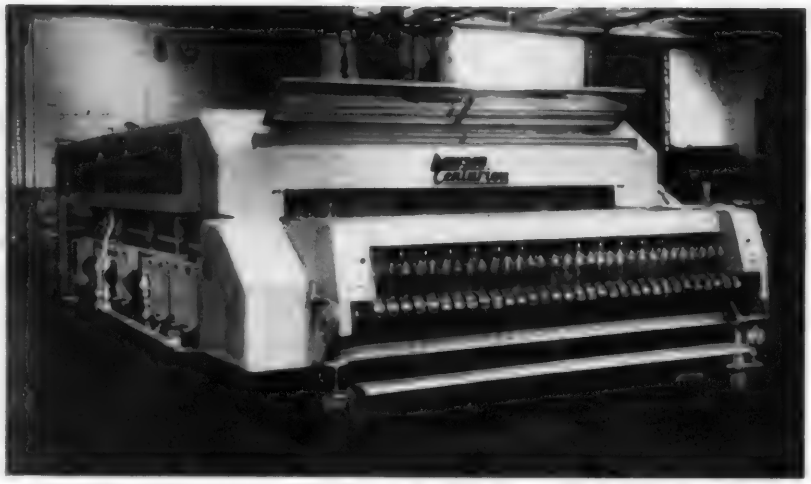
Filling and crowning machines

A range of machines of particular interest to manufacturers of soft drinks and other beverages is made by George S. Clayton, Ltd. Their *42 Vista* syruping, filling and crowning unit is a 42-head counter-pressure filling machine designed for quiet filling at high output rates, and can be used with low or high pressure carbonated drinks. A 12-head syruper of the rising cup positive displacement type or a 12-head injector syruper is incorporated at the purchaser's choice. The crowner is of the rotary type, with seven heads which seal the bottles immediately they leave the filling heads. All parts of the machine coming in contact with the carbonated water and syrup are constructed of stainless steel, and the various parts of the machine are combined in a single monobloc unit built on a heavy cast iron base.

Other filling and crowning units available include the *Clayton FV* vacuum-assisted filling and capping machines, for still liquids, which are available with 6, 10, 12, 18, and 24 heads, and range in capacity from 2,400 to 10,000 pt. bottles per hr. The machines incorporate a cap-making unit, which forms caps from a roll of foil and passes them down a chute for application to the filled bottles. The *Clayton 4 FC* is a 4-head filler also applicable to milk and other still liquids, and again incorporating a cap-making unit.

Beverage mixer

Another interesting machine in the Clayton range is a beverage mixer designed to ensure the thorough mixing of syrup and carbonated water before filled bottles of mineral water are loaded into crates. The machine is placed in the conveyor line following the crowning or stopper-tightening machines, and the mixing is carried out automatically on rotating heads which invert the bottles several times before returning them to the conveyor. Models with 8, 16 and 32 mixing heads are available, the largest model having a capacity of up to 240 bottles per min. Bottle sizes from 4 oz. to 26 oz. can be accommodated.



The Dawson Centurion bottle washer. The machine is supplied with adjustable feet, not shown in this illustration. No special foundations are required.

Paste filler

Apart from their activities in the field of beverage manufacture, Clayton's also manufacture a filling machine for pastes and other non-flowing semi-solid foods. Their *Potta* unit is a vacuum filling machine which will fill up to 50 jars per min., and is claimed to give complete freedom from troublesome air-bubbles in the product. The machine is simple in design, and has a polished stainless-steel finish.

Robert Kellie and Son, Ltd., make a range of equipment of interest to all manufacturers of foods packed in glass. Among their jar filling machines may be mentioned the *Kellie 7* FP, a small unit which works at speeds as low as 40 jars per min. and, at the other end of the scale, the *Kellie* 11 FP, a high speed machine which has a maximum capacity of 240 containers per min. This latter machine is a straight line model, said to be very smooth and accurate in operation and free from spillage and troublesome aeration of the product. The filling level is under the full control of the operator from his normal working position. The machine is extremely well instrumented, the instruments and controls being conveniently grouped on a control panel in front of the machine.

Kellie's also make a number of jar and bottle washing machines. Their 50 JJ model jar rinsing and sterilising machine is suitable for use with high-speed filling machines such as the one described above, and a number of other models is also available.

One of the most interesting of the Kellie models in this field is the Hydroseal unit for the sterilisation and cooling of glass-packed foods. This may be used on such commodities as jam, marmalade, etc., and guards against the growth of moulds on the surface of the product as well as ensuring a good vacuum in the headspace. The treatment occupies some 33 min., made up of a 3-min. sterilisation period, a 5-min. period during which vacuum is formed, and a 25-min. period of cooling.

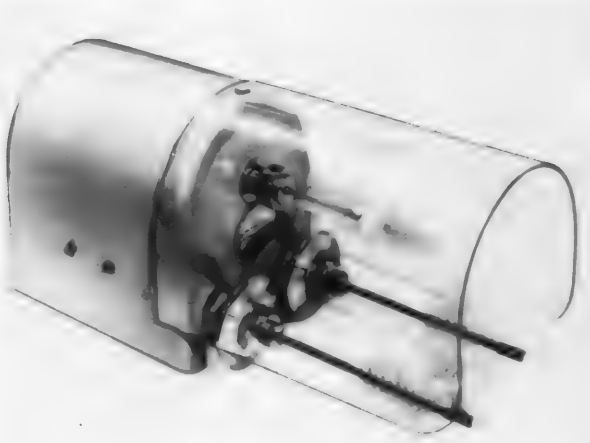
An account of the installation by Robert Kellie and Son, Ltd., of automatic equipment in a German

jam factory was given in the July issue of FOOD MANUFACTURE.

Bottle protection

Clarke-Built, Ltd., are now agents for the Thatcher *NU-Glas* protective bottle coating system, previously described in our January issue (FOOD MANUFACTURE, 1958, **33,** 26). This American invention allows bottles of all types to be treated with an external coating described as consisting of carbon derivatives and silica, which fills up all surface scratches and is said materially to increase the strength of the bottles to resist breakage through mechanical shock, as well as considerably enhancing their appearance. Reductions in line breakages of approx. 50% are claimed for the process.

The unit itself consists primarily of two stainless-steel spray guns, fitted to each side of the conveyor between washer and filler. Compressed air fed through valve-controlled piping feeds the *NU-Glas* solution. As each bottle passes, it automatically receives a complete spraying with the solution, which adheres to the bottle until it is returned to the washer on its next circuit. The process is repeated each time the bottle is used.



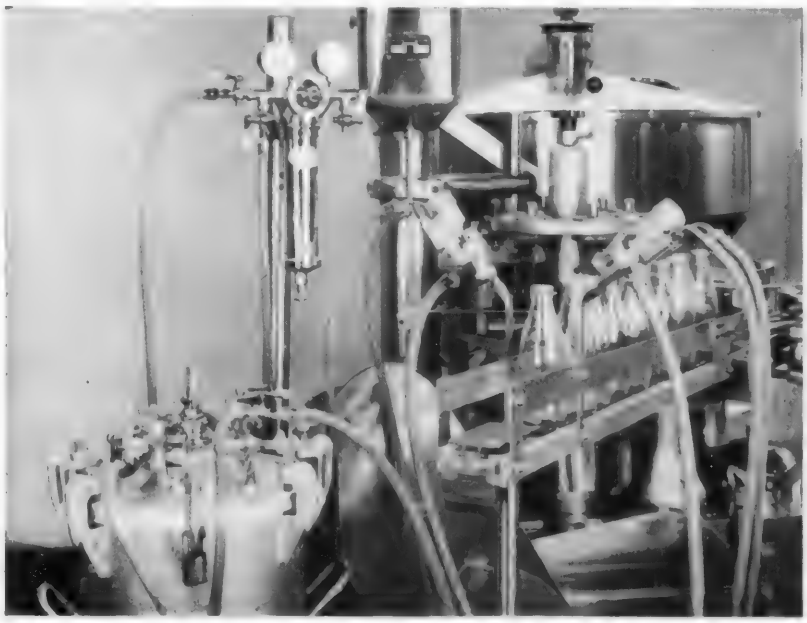
The Swift electric bottle brushing machine, made by Hills of Hull.

Milk bottle fillers

The comprehensive range of equipment made by Clarke-Built, Ltd., for the dairy industry includes a number of filling machines. These are of the conventional rotating type, operating on the gravity-vacuum principle, but employ several interesting features. The main drive is by means of roller chain, and all rotating parts are equipped with heavy-duty ball bearings, which are specially sealed to retain oil and exclude water and dust. Lubrication is positive, by means of a gear pump, and all transmission is totally enclosed in a specially designed oil pan. These features combine to give silent operation and to ensure that maintenance requirements are kept to a minimum.

Bottle pedestals on the Clarke-Built machines are of stainless steel, and the bottles themselves are lifted to the valves by means of limited-pressure springs. Working parts in the filling valves are kept to a minimum, and a system of flexible rubber diaphragms dispenses with springs and valve sleeves. The machines will not fill bottles with cracked or chipped necks, thus guarding the producer against the distribution of such faulty containers, but slight malformations can be coped with, as can bottles of foreign manufacture.

Other features of the fillers include the avoidance of wastage of milk at the filling point by means of dripless fittings, and accurate and rapid filling to a predetermined level. A single hand adjustment is provided for changing bottle size, and a further single handle adjusts the filling speed.



The Thatcher NU-Glas process, machinery for which is supplied by Clarke-Built, Ltd., in operation on a bottling line.

Labelling machines

Several labelling machines suitable for glass packs are produced by the Purdy Machinery Co., Ltd. Their Unimatic machine can apply labels to round, oval, flat, square, polygonal and other surfaces, and a wide variety of shapes and sizes of container can be handled. Single or multiple label work can be accommodated, and labels can be gummed all over to ensure

maximum adhesion. The machine is entirely automatic, the bottles being received from a conveyor by a star-wheel specially adapted to prevent jams or breakages, and delivered back to a conveyor after labelling. A no bottle-no label device is incorporated, labelling being resumed automatically when the flow of bottles recommences. The machine will function at a speed of 65 bottles per min., or 60 per min. where all-round neck-banding is required.

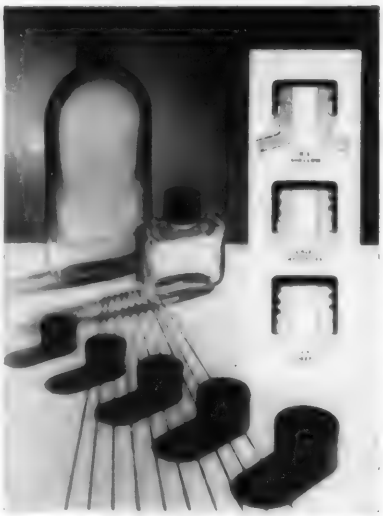
Another useful series of machines is the Purdy *Rotomatic* range. These labellers are available with from one to five heads, the largest machine having an output capacity of up to 375 containers per min. For the smaller manufacturer, the *Universal* semi-automatic and the *Junior* model, which have maximum output capacities of 48 and 44 containers per min, respectively, are versatile machines suitable for a wide variety of applications.

Bottle brusher

An electrically powered bottle-brushing machine, known as the *Swift*, has recently been introduced by the Thomas Hill Engineering Co. (Hull), Ltd. The machine is available in six models, and may have up to five revolving brushes. Three-piece self-centring *Bulldog* brush-holders enable suitable-sized brushes to be fitted for the bottles or jars handled. Care has been taken in the selection of operating speeds, so that the brushes rotate at safe and efficient speeds to give the most effective brushing treatment to the bottles.

For operations on a larger scale, Hill's *Olympian* bottle-cleaning machine combines lengthy soaking in detergent solution with fresh water soaking and a period of simultaneous interior and exterior brushing in a flood of clean water. This is followed by draining, rinsing with fresh mains water, and a further draining period. The machine is manufactured in seven different sizes to suit all outputs between 40 and 170 doz. per hr., and will accommoderate a wide variety of bottles.

Another range of machines well



The Dale Medium Deep Cap screws on to the bottle shoulder.

known amongst bottle users is Hill's *Grangemouth* series of rotary rinsers. These machines are primarily intended for rinsing new bottles, and are in three standard sizes. The 24-bottle unit has an average output, depending to some extent on bottle size and period of rinsing required, of about 1,500 containers per hr. The 60-bottle unit can handle about double this quantity. By means of cups and adaptors, a considerable variety of shapes and sizes of bottle and jar can be accommodated, and although the machines are of standard design the firm are willing to make modifications where necessary to suit the requirements of particular customers.

Washing equipment

Machines for washing all types of bottles and jars are made by Dawson Bros., Ltd. These range from small machines which handle 60 bottles per hr. to large units for the brewing and dairy industries with capacities of anything up to 30,000 bottles per hr. The bottle washers are of two main types—hydro and soaker-hydro. In the hydro machines, treatment is by high-pressure jets, whereas the soaker-hydro type allows for a period of soaking in tanks of detergent solution prior to the jet treatment. Jar washers are mainly of the hydro type. All the machines can be supplied either to wash and rinse the containers or simply to rinse them. A hot-air drying section can be incorporated when necessary.

Typical of the larger machines made by this firm is the Dawson *Centurion* hydro bottle washing machine, the latest addition to the firm's range. This machine is designed for the dairy industry, and has a capacity of 24,000 pt. or half-litre bottles or 18,000 qt. or litre bottles per hr. The machine is said to give extremely low bacterial counts on the bottles by virtue of three principles which it incorporates. The first is a double pre-rinsing operation, in which successive rinses at approx. 70°F. and 90°F. are given. This procedure is said to relieve the detergent section of a great deal of contamination. The second feature contributing to low bottle counts is the fitting of cylindrical nylon pressure filters to each of the three detergent sections, whilst the third is the use of water from the town's main for the two final rinses. The water used in these rinses is recirculated to the pre-rinse section and used again there as a measure of water economy, whilst the method used of filtering the detergent solution is said to give increased economy in this section.

Dawson Bros. also manufacture air-cleaning machines. In these the inside of the bottles receive jets of air which rapidly remove any dust or other matter, which is drawn away by a dust extractor. This type of cleaning machine is normally used for new bottles.

All machines can be supplied with or without a fully-automatic feed mechanism and an automatic discharge system.

Scanning machine

The detection of foreign matter in bottles passing along a high-speed filling line has always presented problems, especially where the individual pieces may be very small and may, in fact, be splinters of the glass itself. The U.D. Engineering Co., Ltd., have now designed a scanner, the *Rotector*, which is said to be capable of detecting the smallest specks of

glass or other foreign matter and rejecting the bottles containing them. This electronic scanner was first exhibited at last year's Dairy Show, where it won two awards in the new inventions section (FOOD MANUFACTURE, **32**, 563, December, 1957) and it is now about to be placed in commercial production. The prototype model has been tested for several months by a large dairying firm, and is said to have proved itself consistently accurate.

The scanner is intended to be placed in the bottling line between the washer and the filler, the bottles passing rapidly through the unit in single file. Interruption of the scanning beam by any solid material inside the bottle automatically operates the synchronised rejection mechanism to divert the offending container out of the main stream for further cleaning. In its present form, the equipment can handle bottles at the rate of 200 per min., so that its use does not involve any slowing down of the production line.

The Rototector, made by U.D.E.C., is an electronic unit for the detection of foreign matter in bottles.

Detergents

A number of detergents suitable for different types of bottle washing and general plant cleaning operations is manufactured by the British Hydrological Corporation. These fall within three main physical categories—colloidal gels, liquids and powders—and each has its own specific application dependent on three main conditions—the type of water available, the type of washer in use, and the type of residue encountered in the bottles. The *Colloidal Gel* bottle washing detergent made by this firm is said to have extremely high powers of cleaning and adsorption, and to be particularly effective in hard water, since it also has strong flocculating properties. The colloidal liquid grades also have a strong colloidal principle, and are of high caustic alkalinity, which enables them to combine good cleaning properties with strong bactericidal action. They are often preferred for use with cleaning machines, as their liquid nature facilitates charging of the machines and efficient mixing of the charge. A wide range of detergents, said to include a grade for every known type of machine and every condition of bottle and washing water, is also available in powder form. Alkalinity varies from extremely high to moderate levels, and various combinations of polyphosphates, wetting agents and anti-foaming compounds are provided for different applications.

The British Hydrological Corporation also manufacture a number of detergents and sterilising compounds based on the quaternary ammonium salts. Their *B.H.C. 350* series has been treated to eliminate the excessive foaming which has often proved a drawback with this type of detergent, and is said to offer high wetting and detergent properties combined with exceptional bactericidal power even at low temperatures. *Deciquam 222* is a quaternary ammonium sterilising agent with very wide applications in all branches of the food and beverage industries, which is also available in a diluted grade, *Deciquat*, and a specially rinsable grade.

Process Engineering

THE complex nature of foodstuffs and the traditional nature of many of the processing techniques has until recently discouraged a chemical engineering approach to the food industry. The changes brought about in the processing of foods are in general the physical changes of true unit operations, however, and the chemical engineering approach is now being made with increasing frequency. This is exemplified by a recent publication,* which deals with the various unit operations which may be met with in the processing of a wide variety of food products. Each operation is considered under three headings: general principles, based upon purpose, mechanism, rate factors methods and horsepower required; description of equipment available for the specific process under discussion; and illustrative description of plant commonly used for the purpose in the food industry. Under the last heading the importance is emphasised of considering the properties of the foodstuff being processed, and their effect on the manufacturing problems and plant requirements.

The book has been written for those who are responsible for the management of plant and for improving its performance. It will prove a valuable guide to engineers entering the food industry without having had much experience of the processing of biological materials, and for chemists and biologists who do not possess a fully adequate background of engineering knowledge.

* *Process Engineering in the Food Industries.* By R. J. Clarke, M.A., A.M.I.CHEM.E. Heywood and Co., Ltd. 1957. Pp. viii+355. Illus. 60s. net.

▶ The second of a series of leaflets published by Evans Chemicals, Ltd., gives examples of some of the services which Evans of Elstree, their subsidiary, offer to manufacturers or manufacturers and packers of liquids, pastes, creams of granular products.

▶ A new multi-lingual illustrated booklet has been published by Imperial Chemical Industries, Ltd., called *Terylene in Industry*. Besides covering the general uses of the material the booklet gives several examples of its use in the food industry.

Autoxidised and Heated Fats as a Nutritional Hazard–1

By A. A. Newman, D.Sc., F.R.I.C.

In our August issue, we commented on the remarks of Professor Frazer, president of the British Food Manufacturing Industries Research Association, to the effect that much more research work should be undertaken into the detailed biochemical reactions of foodstuffs within the body, so that any hazards arising from the consumption of particular commodities might be better understood. This paper deals with one such hazard which may arise during the cooking of fatty materials, and once again the author underlines the paucity of our knowledge and the urgent need for more research.

I. INTRODUCTION

SOMETHING like half of all cancer cases terminating in death are due to the formation of cancerous growth in the alimentary tract, and half of these again are localised in the gastric region.[1]

While the reasons for this prevalence of stomach-cancer are not well understood, it has been obvious for some time that the nature of the foods consumed is an important factor. Since the appearance of the so-called "Singer Report,"[2] the first authoritative survey on the subject, a great deal of new knowledge has been acquired; but as the title of this article indicates, only a particular aspect of this complex problem will be considered on this occasion.

Most fats used for human consumption are unsaturated to a greater or lesser extent, and, depending on this factor, and the amount of heat applied, such fats may undergo a series of changes affecting their nutritional value. In the presence of air, these changes will consist of peroxidation, polymerisation and partial decomposition, a deteriorative sequence collectively known as "autoxidation" or "oxidative rancidification." When the same fats are heated in the absence (or near-absence) of air, the process is known as "thermal polymerisation," and in these conditions, too, unwholesome by-products may be formed. Because fats constitute a major foodstuff, and oxidative rancidity in them is not always apparent,[3, 4, 5] the possible consequences of ingesting such denatured fats will require careful assessment, particularly in relation to problems connected with the domestic and industrial processing of many foodstuffs.

Introducing a paper headed "The carcinogenic action of heated fats and lipids,"[6] the author, a widely respected cancer worker, remarked in 1947 that there is now sufficient *prima facie* evidence to justify the choice of his title, but added that to present the matter *fairly* is no easy task. This is still true today.

As far as the subject-matter of the present article is concerned, it may be best to begin by pointing out that the experimental basis of the conclusions offered later suffers from certain, by no means unimportant, limitations:

(*a*) No direct evidence of the connection between the ingestion of denatured fats and gastric cancer in humans is available.

(*b*) The consumption of even large quantities of denatured fat will not necessarily lead to the formation of pathological lesions.

(*c*) Most of the clinical research-work concerned with autoxidised and heated fats involves the use of test animals (e.g. rats, mice, etc.) whose stomachs are organised on an anatomical pattern differing widely from that of man.

(*d*) The experimental regimens to which the animals are submitted are usually too severe to simulate average human conditions.

One is bound, on the other hand, to add that there is no practical alternative to such experiments, and when properly organised, the use of such diets and test-animals will reliably reflect the nature of the corresponding reactions in the human body.

II. THE PATHOLOGY OF AUTOXIDISED AND HEATED FATS

There is no lack of published material on the subject, but unfortunately the information contained in these papers is of a rather disparate nature. It may refer to different test-animals, fats, temperature levels, diets or experimental periods. Under the circumstances, it may be best to discuss a few articles so selected as to cover a representative range of such pathological lesions as may result from the consumption of denatured fats.

One of the earliest experimental accounts, due to D. W. Whipple, of the University of Pennsylvania,[3, 4, 5] describes the consequences of offering dogs a diet adequate in all other respects, but containing 25% of fat treated with oxygen at 60°C.

"Within a variable time after the first loss of hair was noted, a rash appeared and spread over the body. About this time, the appetite began to decline, and the dogs became less lively. The stools were black, and inclined to be hard. The skin lesions became worse, ulcers appeared over the bony protuberances, and rapidly became deep, sometimes exposing the bone. There was little inflammation about them and did not seem to be tender. The dogs be-

Photographs by courtesy of the Journal of the American Oil Chemists' Society.

Paired feeding tests using fresh and thermally oxidised corn oil. *Left:* **At 15 days, basal diet plus 20% fresh corn oil.** *Right:* **at 15 days, basal diet plus 20% thermally oxidised oil.**

came weaker, and frequently, convulsive movements of the extremities were noticed. The constipation gave way to diarrhœa which was usually blood-tinged, and frequently frankly bloody. The animals became weaker and finally died."

An interesting feature of Whipple's experiments, lasting some 4 months, was that for a considerable period the dogs remained lively, and even managed to put on some weight.

The example given above is, of course, not really representative, as the use of undiluted oxygen for the treatment of the fat, combined with the inclusion of such a high percentage of denatured fat in the diet, would make the experimental conditions excessively harsh and tend to shorten the period available for clinical observations. Nevertheless, it was considered useful to quote that particular case in order to show what can happen under extreme circumstances. Of greater practical interest are some investigations by Beck and Peacock, of the Glasgow Royal Cancer Hospital,[7] involving processing temperatures that are likely to prevail during the daily preparation of meals in the family kitchen. For the purpose of their experiments the two workers used a half-and-half mixture of cottonseed and whale oils, repeatedly heated to 200/220°C. up to a total period of 12 hr. On offering their test-animals a feed consisting of bread spread with the above mixture of fats, the following results were obtained:

Out of a batch of 44 Norwegian hooded rats, surviving more than 4 months,

4 died without lesions, while of the remainder,

4 developed multiple ulcerated papillomas of the forestomach;

3 developed single papillomas of the same type;

2 developed non-ulcerated papillomata;

2 exhibited hyperplasia;

1 developed hæmorrhage of the forestomach.

There were, in addition, two cases of lesions in the *glandular region*, involving simple and multiple ulcer-hæmorrhages respectively.

Most of the lesions listed here appeared to be due to avitamosis caused through the oxidative destruction of Vitamin A by some agents present in the heated fats, and parallel tests conducted on the livers of animals, specially killed for the purpose, confirmed that hepatic depletion of Vitamin A had indeed taken place.

Vitamin A, however, is not the only vitamin so affected; in fact, it would be difficult to find one that will not be damaged or destroyed by the peroxide activity of autoxidised fats.[8] To quote only two representative examples, Morris, Larsen and Lippincott[9] have found that following the consumption of lard heated to high temperatures, their test-animals were subject to tremors, muscular atrophy, sterility and encephalomacia, all signs of vitamin E deficiency. Similar considerations apply also to pyridoxine, the lack of which in the body will lead to acrodynia. Here the connection between the vitamin and the peroxide groups is so close that Kummerow, Ta-Kung Chu and Randolph suggested that the experimental production of acrodynia might be used to test whether a fat is oxidised.[10]

Higher temperatures

So far we have dealt with fats heated at relatively low temperatures and the effects of such fats, though startling at first sight, are often reversible by the adoption of a more wholesome diet.[7, 11, 12] The position becomes more serious when the fats incorporated in the diet were previously subjected to higher temperatures.

In a series of publications going back to 1938, A. H. Roffo,[13, 14, 15] director of the Cancer Research Institute in Buenos Ayres, claimed that by heating for a relatively short period (e.g. ½ hr.) such animal and vegetable fats as lard, beef-suet, mutton-tallow, olive and sunflower-seed oils, and also cholestrol, to 350°C., he succeeded in inducing cancerous growths in the *glandular stomach* of his test-animals, a region much more resistant to such attack than the rumen.

According to Roffo, in one series of experiments, out of a batch of 200 rats fed on a diet compounded of bread, milk and heated fats, over one-third of the animals developed some sort of lesion in the alimentary tract, ranging from five cases of glandu-

lar cancer tumours, to papillomas, ulcerated papillomas and squamous carcinomata of the fore stomach. In some of the more severe cases, the stomach lesions were associated with spindle-cell sarcomas of the liver. In contrast, one thousand control animals fed on a corresponding diet incorporating fresh fats, no trace of tumour formation could be detected. Essentially similar claims were made when these fats were offered in the form of injections. Roffo's results, exceeding anything reported before, led to a great deal of confirmatory work by other investigators, and one group went as far as importing rats belonging to the same colony as used during the original experiments. By and large, these workers were unable to corroborate Roffo's findings, at least as far as the effect of such fats on the *glandular stomach* was concerned. Furthermore, Klein and Palmer[16] have pointed out that while the growths induced by Roffo in the glandular zone were highly malignant, they nevertheless failed to satisfy such essential criteria of true cancerousness as irreversibility, metastasis and transplantability. Waterman's claim[17] to have induced adenocarcinoma by means of cholestrol-oleate, was contested on the same grounds. However weighty these objections may be, it remains undeniable that with feeds containing heat-damaged fats, the glandular citadel can be penetrated. As an example previously quoted shows, the nature of the fat can be as important as the temperature to which the fat has been submitted. Be it as it may, Ivy and his group,[18] Peacock and Beck,[19] and Peacock, Beck and Chalmers[1] all report various glandular lesions, some of fairly serious character. Cases of forestomach carcinoma are, of course, relatively easy to induce with fats heated to higher temperatures, and all the three groups of workers do in fact report such developments. In this connection the present writer feels justified in suggesting that the behaviour of the rumen is a better indication of the possible effects of a denatured fat on the human organism than the much more resistant glandular portion.

III. AUTOXIDATIVE AND THERMAL CHANGES

In a previous section, reference was made to the fact that, under certain conditions, fats containing unsaturated linkages will undergo a number of important changes. Before proceeding to the examination of the toxic agents thus formed, it will be necessary to discuss in somewhat greater detail the nature of these changes.

Hydroperoxidation

The action of oxygen on unsaturated fats will lead to the attachment of hydroperoxide (−OOH) radicals to the fatty acid components of the glycerides. The facility with which this process will take place will depend, *inter alia*, on such factors as degree of unsaturation and isomeric status of the fatty acids involved. Generally speaking, there will be two favoured points of attachment on the carbon-chain: (*a*) the α-methylene position with respect to a double-bond, and (*b*) the double-bond itself. According to Farmer,[20] the initial reaction always occurs on the double-bond, while its subsequent course will depend on the relative positions of the several double-bonds to each other. When the double-bonds are conjugated, these will continue to act as points of attachment, otherwise the α-methylene positions will be preferred. As, however, the latter reaction-scheme involves rearrangement of the double-bonds, the final mixture will always contain a higher proportion of conjugated fatty acids. The formation of the hydroperoxides is based on a free-radical actuated autocatalitic chain-reaction, proceeding roughly as follows:

At higher temperatures the formation and disintegration of the hydroperoxides will be greatly accelerated, and, although this is not an absolute rule, a fat will, on balance, contain less hydroperoxide after heating than before it.

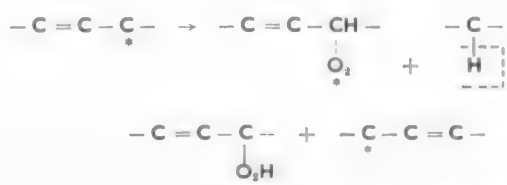
Scission reactions

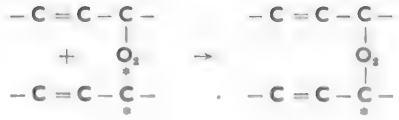
An important feature of the hydroperoxidation process is that a proportion of the peroxides formed will tend to undergo various changes, including the formation of a complex mixture of reaction products, e.g.: cyclic peroxides, peroxidic free radicals of fatty acids, non-peroxidised aldehydes, ketones, keto-aldehydes, hydroxydated and branch-chained compounds, lactones, epoxides, cyclic compounds and fatty acids with greatly shortened carbon chains.

Polymerisation

All unsaturated fats tend to thicken in time, even at ambient temperatures, but much more so when heated, owing to the formation of dimeric and higher polymeric bodies.

Polymerisation may be regarded as an important stage in the autoxidation process, and it, too, is governed by an autocatalytic, free-radical actuated reaction-scheme such as described under a preceding heading. The progress of polymerisation will depend, among other things, on the amount of conjugated fatty acids becoming available, but there is some evidence to show that "co-polymerisation" (that is, combination of conjugated with non-conjugated fatty acids) is also possible.[21, 22] The exact nature of these so-called "oxidative polymers" is not well known, but the presence of −o−o− linkages is widely assumed. Bolland and Gee[23] suggest that reaction proceeds as shown in the next column:





Once the dimer is formed, it may undergo peroxidation again, and grow by successive stages into a higher polymer. It is hardly necessary to stress that the scheme given here is a simplified one. Depending on conditions, one may arrive at different polymeric structures. Potentially important in this respect are the formation of *intramolecular* polymers, and the reactions of peroxide radicals with double bonds.

Finally, one should mention that for the purpose of flavour-stabilisation certain fats, especially fish-oils, are often deliberately polymerised, usually under vacuum. Here, of course, no peroxidation will take place, and the polymer-linkages are probably of the direct carbon-to-carbon type.

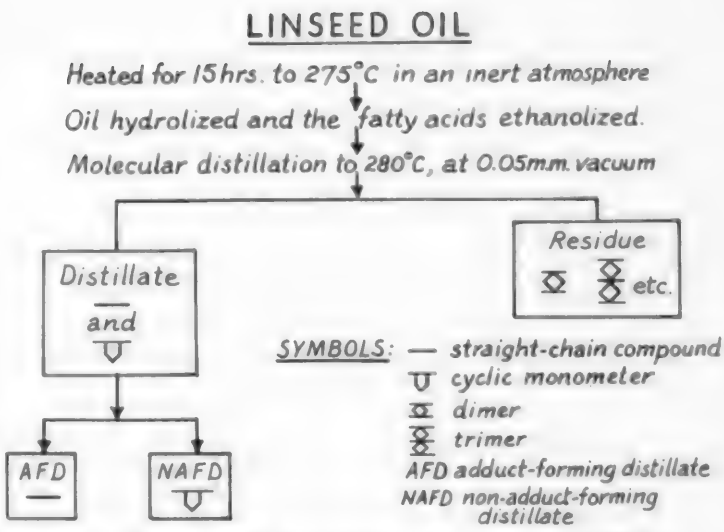
IV. ISOLATION OF THE TOXIC AGENTS

In order to understand the physiological action of autoxidised and overheated fats, it is desirable to study the toxicity of as many of the deleterious substances listed earlier as can be conveniently isolated. There are a number of techniques available for the purpose, and these may be used either on their own or in combination with each other.

Solvent extraction. Methods belonging to this category extend from crude single-stage extractions to the more sophisticated multi-stage system used by Chang and Kummerow,[24] and the highly efficient counter-current procedures surveyed by Privett, Lundberg and Nickell,[25] or Kaneda, Sakai and Ishii.[26]

Molecular distillation. Farmer and Sutton[27] were probably the pioneers of this obvious method. Opinions as to its usefulness range from Kass's[28] belief that heating will lead to denaturation, to that of Norris and co-workers[29] that only negligible changes will take place during the operation.

Chromatography. Although frequently resorted to by research-workers, this method has not been found entirely suitable for the purpose in view. Adsorption tends to be somewhat unselective, and special measures have to be taken to guard the unsaturated compounds retained on the column against aerial oxidation.



Urea adduct segregation combined with molecular distillation.

Urea adduct segregation. This procedure, originally discovered by Bengers[30] during the last war, has proved of some importance because it will permit a division of the reaction mixture along biologically significant lines. When applied to the esterified fatty acids of autoxidised and thermally affected fats, the adduct forming portion (AF) will contain the nutritionally wholesome (or only slightly toxic) compounds, while the non-adduct-forming portion (NAF) will comprise the more deleterious substances. Used in conjunction with other separation methods, it will afford a reasonably useful fractionation of the main types of toxic products. Generally speaking, only such monomeric, straight-chain compounds as unaltered fatty acids, aldehydes, ketones and hydroxylated derivatives of the fatty acids will form urea adducts, while branch-chained compounds, difficultly-conjugable cis-trans isomers, cyclic monomers, peroxidised and polymerised fats or fatty acids will not do so.

As an example of what the urea-adduct method in combination with, say, molecular distillation, can do, is given above. It is taken from one of a long series of papers by Crampton and associates,[31] devoted to the study of the nutritional damage of various heated oils and fats. The symbols used are those of the original article.

The separation process depicted here is somewhat idealised, as in each fraction only the main types of substances are given. For other instances of urea segregation, see Kaneda, Sakai and Ishii (l.c.) and Coleman, Knight and Swern.[32]

In Part 2 of this article, to be published shortly, the author discusses the relationship between structure and toxicity and the effects of domestic and industrial handling.

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liquid whistle type giving higher output on higher energy levels. It is expected that these will be available on a limited scale within the next few months.

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▶Leaflets have recently been issued by the Sturtevant Engineering Co., Ltd., describing their wet-type dust collector or gas scrubber and their *Newgate* grit collector. The firm make several types of scrubbers for which they claim efficiency in excess of 90% at low operating costs. The grit collector is intended for the separation of grit and fly-ash from flue gases.

Glass Containers and Research

(*Concluded from page* 365)

capacity. The weight of a container is not only of interest to the manufacturer who has to pay handling and freight charges, but to the retailer and the housewife who carries the jam and pickles home in her basket. Re-designing has been so successful that the lighter containers have in use proved to be stronger than the older and heavier ones, apart from their advantages in handling. A large range of re-designed standard containers now exists. Although little publicity has been given to the fact, in the past 13 years glass containers in the food shops have undergone a revolution.

The Committee began with a list of such standard designs as beer, mineral-water, vinegar and other bottles. Within three years they had done so well that they took on a second list which included bottles for coffee essence, tomato ketchup, peroxide and oils. In addition to re-examining old designs and preparing new specifications, they are at present considering new closures and finishes, the standardisation of ring finishes and co-operation with the B.S.I.

Co-operative research

Mention of closures is a reminder that glass containers are not solely the interest of glass manufacturers. The container manufacturer must provide a neck finish to accommodate the most suitable type of closure for the product. Sometimes the closure has to be absolutely gas-tight, but where the container is not likely to be on the shelf for long, a reasonably air-tight fit is all that is required. Any cap, however, must fulfil the condition that the customer shall be able to get it off without soiling the fingers and, where necessary, replace it easily.

Thus besides the glass manufacturer, the packer and the manufacturers of closures and filling and washing machinery are all involved. Accordingly, out of the work of the Container Research Committee has arisen co-operation between the trade associations representing these interests. Two bodies now exist to facilitate the exchange of opinions and suggestions. One, the Joint Technical Committee, comprises members from the glass industry and the closure industry. The other, the Joint Consultative Committee, represents the glass industry, the British Closure Manufacturers' Association, the Food Manufacturers' Federation and the Food Machinery Association. Apart from this permanent liaison, the Container Research Committee maintains contacts with numerous other bodies associated with the production of containers (such as the Crown Cork Manufacturers) and the producers of all sorts of solids and liquids for consumption.

In the shop, the glass jar or bottle, made to withstand breakage and to provide convenient and safe storage, has the further function of acting as a silent salesman. In recent years that function has greatly increased. The self-service store has, of course, made the appeal to the eye all-important. Because it is transparent the glass container provides a little shop window on its own, and often it indicates its contents by a characteristic shape. With a label worthy of its own good design, it can very effectively advertise what it contains. But every new development brings a new problem, and the one raised by self-service stores, and taken up by the Glass Container Research Committee, arose from the practice in these new-type shops of stacking glass containers on top of each other. That illustrates a problem for the manufacturers of glass containers and closures with which the Committee is equipped to deal.

▶The latest edition of the *Prestcold Times*, issued by the Pressed Steel Co., Ltd., describes some of their installations throughout the world. Subjects include a butchery in Holland, a meat depot in Torquay, a mushroom growing establishment, and the unlikely topic of selling refrigerators to eskimos.

The Problem of Improving Nutritive Value

With Special Reference to the Enrichment of Foods—3

By E. Menden and H. D. Cremer*

In subsequent parts of this article the authors discuss the substances which can be used for enrichment of foods, and the types of food which can best benefit from such enrichment. They begin by discussing the substances used for vitamin enrichment.

(b) FOOD FACTORS USED IN FOODSTUFFS ENRICHMENT

1. Vitamins

Vitamin A

VITAMIN A, an alcohol of high molecular weight, belongs to the group of fat-soluble vitamins. It is found particularly in fish liver oil, mammals' liver, milk, butter and egg-yolk.[15,37] Vitamin A, in the form of carotene—a "provitamin" or "biological precursor," out of which the human and animal organism can synthesise the vitamin itself—is contained particularly in palm oil, vegetables and fruit.[15,37] Chemically pure vitamin A, and pure carotene, can be obtained either by isolation from the natural product, or by synthesis.[146] In biological experiments no difference has been discovered between "natural" and "synthetic" vitamin A.[147]

The foods proposed for enrichment with vitamin A are: margarine,[7,8,12,136,148,149] lard,[12,148] and milk—particularly sterilised milk, powdered milk and condensed milk.[12,18,91] The enrichment of margarine with vitamin A is already frequently undertaken.[135] The enrichment of sweets with vitamin A has occasionally been proposed,[150,151,152] but this is of no real significance.

The usual addition of vitamin A to margarine is between 20,000 and 33,000 International Units per kilo.[135,149] 1,000 I.U. correspond to 0·3 mg. of vitamin A alcohol. The addition in Germany amounts to 20,000 I.U. per kilo margarine.[135] In preparations for infants made from dried milk solids a supplement of 4,000 I.U. per quart of milk is recommended.[91] "Vitamin-chocolate" should contain 120% of the minimum daily requirement of vitamin A in every 50 g. of the finished product; this corresponds to a supplement of 6,000 to 8,000 I.U. per 100 g. of chocolate.[152]

Vitamin A may be mixed into foods as an emulsion or as a solution in oil. Synthetic vitamin A, particularly in the form of the palmitate, is preferred for vitamin chocolate[152] because of its complete lack of taste in the finished product. The natural product and the synthetic product are identical in reaction and in stability,[149,150] and the method of addition—whether as an emulsion or as an oily solution—has no effect on the biological availability or the stability of vitamin A.[153] Even after prolonged storage at room temperature, only a relatively small loss of vitamin A or carotene can be detected;[154] after 14 weeks, the loss in good margarine amounts to an average of 15%.[149]

No harmful effects need be feared from the use of foods enriched with vitamin A. Experiments with rats using overdosages of pure vitamin A showed that a daily dosage of 40,000 I.U. did not affect the general condition of the animals.[155] In therapy, daily doses of up to 400,000 I.U. have occasionally been given over long periods (up to twelve months) without any damage resulting.[155] The "safety margin"—or the ratio of the normal daily dosage to the limiting value in which the first symptoms of overdosage appear—for vitamin A is 1:100.[18]

Vitamin D

Vitamin D belongs, as does vitamin A, to the group of fat-soluble vitamins. Strictly speaking, there is no single "vitamin D," only a group of effective anti-rachitic agents of very similar chemical constitution which are known as D_2 . . . D_4. The real "vitamin D" (vitamin D_3) is found in fish liver oils, in herring-fat and in egg-yolk.[15,37] Vitamin D_2 is also especially important as a source of vitamin D activity.[15] Provitamin D_3 is found in the unsaponified fraction of animal fats; provitamin D_2 occurs in yeast and fungi.[15,37]

The production of vitamin D is possible either by isolation from natural products or by semi-synthetic means using the ultraviolet irradiation of the ergosterols which can be easily isolated from yeast.[146] Vitamin concentrates from natural products and vitamin D produced by irradiation are of equal value in antirachitic activity.[146,147]

The foods proposed for enrichment with vitamin D are: margarine,[7,136,147,149] milk (particularly sterilised, powdered, and condensed milk,[132,148,156] bread,[76,132,140,157] and sweets[151]—amongst these, especially "vitamin chocolate" for military rations.[132] The vitamin D enrichment of margarine, milk, and bread is already being undertaken extensively, partly on a compulsory, partly on an optional, basis.[135]

The usual vitamin D supplement for margarine is between 300 and 3,500 I.U. per kilo.[135,149] 1,000 I.U. correspond to 0·025 mgm. of vitamin D_2 or D_3[15]: the range is considerable. In Germany, the average supplement is 300 I.U. per kilo.[135] A supplement of between 450 and 1,000 I.U. per litre

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is required in liquid milk, and of between 4,000 and 10,000 I.U. per kilo in milk powder. The amout of the vitamin D supplement in bread lies between 330 and 1,650 I.U. per kilo.[135] "Vitamin chocolate" should contain 800 I.U. in 100 grams of the finished product.[152]

The practical enrichment of food with vitamin D is accomplished either by the addition of a vitamin concentrate in oily solution, or, in some suitable cases, by ultraviolet irradiation; the latter method requires the presence of ergosterol (as for example, in milk), and it has the disadvantage that exact dosage is not possible. It is, however, often applied.[156]

The stability of vitamin D in enriched foods is satisfactory; it has been shown to remain unchanged in the presence of both oxygen and heat.[15,37] Generally speaking, the normal ingestion of foods enriched with vitamin D has no harmful effects. The "safety-margin," or the ratio of the usual daily dose to the level at which the first symptoms of toxicity appear, is as 1:100.[48] However, children fed vitamin D—enriched infants' foods, and receiving, simultaneously, large doses of vitamin D are in some danger of hypervitaminosis D.

Thus it has been suggested in various quarters that infants' foods and milk should continue to be enriched with vitamin D, but that the additional dosing with the vitamin should be discontinued, except in those cases where high doses are actually required.

Vitamin E

Vitamin E (tocopherol) is soluble in fats and insoluble in water—in the same manner as the vitamins A and D. In the natural form, it is found mainly in wheat-germ, leaf and seed vegetables, soya, milk, pork and beef, liver, kidney, egg-yolk, animal and vegetable oils, and yeast.[15,37] Production is possible either by isolation from natural products, or by synthesis.[16]

The enrichment of foods with vitamin E has been highly recommended, especially of margarine and of milk;[7,18] however, these suggestions have not yet been put into practice.*

Vitamin C

Vitamin C (ascorbic acid) belongs to the group of water-soluble vitamins. It is found in all living tissues; green vegetables and fresh fruits are especially favoured for their vitamin C content.[15,37]

The production of vitamin C can be accomplished by isolation from natural products, but much cheaper synthetic methods are possible.[146] "Synthetic" vitamin C corresponds in every way to "natural" vitamin C.[146] Foods proposed for enrichment with vitamin C include: fruit and vegetable products,[132,136] sweets,[151,158] and beverage powders and "vitaman chocolate" for military rations.[152,158]

Vitamin C suffers very heavy losses because of its great sensitivity to oxygen,[93] and the quantity of the vitamin added directly to enriched foods must be determined according to the length of the storage time expected, and the manufacturing process to which it is to be subjected. If the losses are found to be too high, and, hence, full supplementation not possible by direct enrichment, then additional doses of vitamin C are occasionally given in the form of tablets distinct from the diet.[159] Thus vitamin C programmes played a large role, particularly in Germany, during the last war. The armed forces, school-children, and infants were regularly given large amounts of vitamin C, either as candy or as tablets.[156] Nevertheless, the direct enrichment of foods with vitamin C will frequently be of value—if only for the secondary reason that the antioxidant properties of vitamin C can assist in preserving the freshness of food. Thus a vitamin C supplement added to frozen fruit, or to fish; to fruit juices, to beer, or to meat products, can retard those changes in taste and appearance which are attributable to the effects of oxidation.[136]

No harmful effects need be feared from too high a supplement of vitamin C; toxic symptoms have not been established even for very high dosages of the vitamin. Daily oral vitamin C doses of 3-5 g. are not rare in therapy,[15] this corresponds to forty to sixty times the recommended daily dose.

The Vitamin B-complex

The vitamin B-complex consists of a group of substances which are characterised by their solubility in water and by the fact that they are almost always found together in nature. Experimental and clinical observations have shown that, in certain cases, they work more effectively as a combination than as single entities;[15] hence, it seems reasonable to consider the separate members of the vitamin B-complex collectively. On the other hand, these separate members of the B-complex have structural forms and pathological functions of such decidedly individual character that these, in particular, have to be treated separately. Vitamin B_1, vitamin B_2 and nicotinic acid will be specially mentioned because these come into consideration for the present-day enrichment of food; some reference will be also made to the importance of pyridoxine, pantothenic acid and vitamin B_{12}.

Vitamin B_1. Vitamin B_1 (thiamine, aneurine) is found particularly in grain-germs and in yeast; but also in various vegetables and fruits, egg-yolk, milk and different animal organs.[15,37]

Vitamin B_1 can be produced by isolation from natural products, or by synthesis.[146] Synthetic vitamin B_1 has been adopted for the enrichment of foods; it cannot in any way be differentiated from the "natural" form.[27,76,120,143,145,157,160,161,162,163]

Flour and bread are the principal nutrients which have been considered for enrichment with vitamin B_1.[27,53,143,145,157,160,161,162,163,164,165] Rice is now often enriched with vitamin B_1 particularly where rice is the

* In the Federal Republic of Germany a vitaminised margarine which contains vitamin E as well as vitamins A and D_3 has now been announced; the vitamin E content is 5 mg. α- plus β-tocopherol per kilo.

staple food.[24,162] In addition, sweets (particularly chocolate) have been recommended for enrichment with vitamin B_1.[151,152,155] Of lesser importance, are some proposalse to add vitamin B_1 to other foods such as precooked and dehydrated soups,[158] and beer.

The amount of the vitamin added must be so determined that the average quantity of the respective food normally consumed will contain the recommended dose of vitamin B_1; hence, the fact must be taken into account that, in the customary heating processes, such as cooking and baking, some part of the vitamin B_1 is destroyed. Similarly, the original vitamin B_1 content of foods (which is determined in flour and bread by the extraction rate) must be duly considered.[145] Consequently, the enrichment of low extraction flour is of particular importance.

In Germany, extensive proposals for the enrichment of flour and bread with vitamin B_1 range between 4 mg. and 5·6 mg. of crystalline vitamin B_1 per kilo of flour.[27,33,143,145,161] In other countries, supplements of vitamin B_1 to flour—which may be merely "permitted," or may be compulsory—lie between 1·65 mg. and 5·5 mg. per kilo.[53,131,135,140,157,163,165] Higher vitamin B_1 supplementations are required for flour paste products (such as macaroni) and for rice[120] because the losses expected during cooking can amount to 50%. The final cooked product should contain 8·8 mg. to 11·0 mg. of vitamin B_1 per kilo.[24,135]

The stability of vitamin B_1 in enriched foods depends, to some extent, on the form in which the vitamin is present. Synthetic thiamine mononitrate shows greater stability in flour during storage, and during the baking process, than does either natural thiamine or thiamine hydrochloride.[166] Thiamine hydrochloride is very hygroscopic, and hence less stable, especially under moist, warm storage.

Losses of vitamin B_1 have been encountered both during the baking process and in the preparation of the dough. The sensitivity of vitamin B_1 to alkaline media[15]—such as occur in doughs having a *p*H of over 6·6 (owing to the presence of bicarbonate or of the various other baking-powder additions made to flour)—results in extensive destruction of the vitamin.[80,167] In order to protect the vitamin B_1, the *p*H-value of the dough must lie below 6, and that of the baking-powder below 7. Normal baking processes can result in losses of up to 30%.[120,168] Losses are negligible over shorter periods of heating (up to 5 min.),[169] but a decided decline in the vitamin B_1 content occurs under continual heating for longer periods of time.[83]

Another observation has been made which is still to be confirmed, however, and must be received with reservation: it is that a supplement of 3 mg.-6 mg. of vitamin B_1 to one kilo of flour increases the volume of the pastry made from it by some 6·8% to 15·7%.[170]

No harmful effects from vitamin B_1 need be feared, even with extremely high intakes of enriched foods. In one experiment, for example, children were given a daily supplement of 2 mg. of vitamin B_1 in addition to their usual diet (which already contained ample amounts of vitamin B_1) for a period of one year. Improved aptitudes, greater skills, and quicker responses were established when these children were compared with children having a "normal" supply of vitamin B_1.[171] The ratio of the normal intake to the dosage at which the first toxic symptoms appear amounts with vitamin B_1 to 1:20,000.[48]

Vitamin B_2. Vitamin B_2 (lactoflavin, riboflavin) is found in yeast, wheat-germ, vegetables, milk, eggs, fish and various animal organs.[15,37] The production of chemically pure vitamin B_2 is possible either by isolation from whey (in which it is contained in large amounts);[148] or, more usually these days, by synthesis.

Those foods selected for enrichment with vitamin B_1 may also be enriched with vitamin B_2. The addition of vitamin B_2[149] to margarine, which has been occasionally proposed, is to be regarded less as a measure to improve nutritive value than as a measure merely to add colouring.

In various countries, the addition of vitamin B_2 in the enrichment of bread and flour, whether proposed or statutory, ranges between 1·25 mg. and 5 mg. per kilo of flour.[53,134,135,136,140,157,165] Under German conditions, a supplement of 2 mg. per kilo of flour should be sufficient.[23,161]

The stability of vitamin B_2 in enriched foods is satisfactory, since it is not sensitive either to heat or to oxygen.[15] Decomposition occurs only under intense light—but especially in neutral or slightly alkaline media. Beer, to which vitamin B_2 had been added, showed a vitamin B_2 loss of 85% after storage in clear bottles for twelve weeks; in dark bottles the loss was 40%.[172]

Nothing is known of any harmful effects following upon a high vitamin B_2 intake associated with an abnormally heavy consumption of food enriched with vitamin B_2. Daily dosages of up to 30 mg. of B_2 are not unusual in therapy; this is fifteen times the normal daily consumption of vitamin B_2.[15,37]

Nicotinic Acid. Nicotinic acid (niacin) is found in yeast, cereals, fruits, vegetables, milk and various animal organs.[15,37] It is possible to produce nicotinic acid by isolation from natural products or by synthesis.[146] The synthetic product, identical in every respect with the natural form, is preferred for enrichment.[145,151,157,160,161,162,165]

Nicotinic acid like vitamin B_2, is also proposed for the enrichment of those foods shown under vitamin B_1.

The amount of nicotinic acid necessary for flour enrichment, particularly for low-extraction wheat-flour, is given as between 13 mg. and 44 mg. per kilo of flour.[134,135,140,157,163,165] A supplement of 30 mg. per kilo of flour is probably the most suitable under German conditions.[161]

The stability of nicotinic acid in enriched foods is satisfactory because it is unaffected by heat or oxygen,[172] and its sensitivity to alkalies is of no importance.

No harmful effects from the high consumption of foods enriched with nicotinic acid need be feared; in therapy, a normal daily intake of ten to twenty times the "recommended dietary allowance" is common without any noticeable toxic side-effects.[15]

Pyridoxine. Pyridoxine (adermin, vitamin B_6) is found mainly in yeast, cereals, vegetables, egg-yolk, and milk.[15,37] It can be produced by isolation from natural products, and synthesis is also possible.[146] Neither examples of nor practical proposals for the enrichment of foods with pyridoxine are known. It has been demonstrated, in animal experiments, that the addition of pyridoxine to wheat-flour of low-extraction in amounts of 7 mg. per kilo results in an improvement in growth.[39,40,41]

Similarly, positive effects on growth were seen in rats fed a normal American army ration enriched with pyridoxine.[38] Without doubt, therefore, the enrichment of foods with pyridoxine should be taken into consideration; and the practical application has already been discussed in England and America.

The stability of pyridoxine is satisfactory and would be sufficient for enrichment purposes.[37,87] Ill-effects from an exceedingly high intake of pyridoxine are hardly to be feared; the use of pyridoxine in therapy shows that, even in pediatrics, daily doses of 300 mg. applied parenterally, are tolerated without discomfort.[15]

Pantothenic Acid. Pantothenic acid occurs mainly in yeast, green vegetables, cereals, egg-yolk, and in animal organs.[15,37] It is produced both by isolation from natural products, and synthetically.

An improvement in growth was established, in some experiments on animals with a supplement of 20 mg. of pantothenic acid to one kilo of wheat-flour of low-extraction.[40] Enrichment measures using pantothenic acid are, however, not as yet known. Pantathenic acid is thermostable, and it is not sensitive to oxygen.[15] The usual therapeutic dose of pantothenic acid exceeds the (probable) daily requirement by some twenty- to forty-fold, without any harmful effects appearing.

Vitamin B_{12}. Vitamin B_{12} is found in soya-beans, egg-yolk, whey, fish-flour, liver and muscle.[15,37] It is produced by isolation from natural products. The chemical constitution of vitamin B_{12} has recently been determined.

It is true for vitamin B_{12} as for pyridoxine and for pantothenic acid: additions of vitamin B_{12} to wheat products (0·0001 mg. per animal per day) are effective in improving weight gains. At some time in the future, perhaps, the enrichment of foods with vitamin B_{12} will be considered,[11] but it cannot at present be discussed because of our still limited knowledge of the part the vitamin plays in metabolism, and of the vitamin B_{12} requirement.

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▶W. J. Bush and Co., Ltd., have published a leaflet describing Pineapple F. their new flavour in the Witham range. Suggested uses for the product are given, and suitable quantities are listed for the flavouring of sugar confectionery, sundry food products, beverages and ice cream. Samples of both flavour and confectionery are available on request.

▶Some of the ways in which transparent film is being used to answer the call for convenience in packaging are discussed in the pages of a recent issue of *Merchandising Vision*, which is published by British Cellophane, Ltd. Particular attention is devoted to the strip and unit packaging of tablets, capsules and other small articles in *Cellophane* cellulose film.

Advances in Food Technology

MEAT PRODUCTS

Effect of Additives on Meat Fibres

In connection with the controversial question of permitting phosphate admixtures to meat products, German research workers have investigated the effect on meat fibres of the normal additives in meat processing, using micro-photographical methods. A distinction was made, in principle, between two groups of substances, viz., non-swelling salts which form "genuine" solutions (e.g., sodium citrate, sodium tartrate, sodium lactate, sodium acetate, polymeric sodium phosphates, kitchen salt) and "self-swelling" substances such as flour, starch, milk powder, casein, dextrine. It was found that additives of the first type have a direct effect on the meat protein, altering its structure and consistency and forming soluble protein substances ("salt effect"). Substances of the second type have no direct effect on the meat fibres but they act as "glue" to them, binding them together. They must therefore be regarded as "binding agents" of the kind prohibited under German law.—H. Popp, F. N. Mühlbrecht, *Die Fleischwirtschaft*, 1958, **10**, 399.

POULTRY

Increasing Storage Life

Attempts have been made to increase the storage life of uneviscerated poultry carcases by administration of antibiotics to the birds before slaughter. Using the time taken for the appearance of greening of the carcases—an early sign of spoilage—as a criterion, it was found that supplements of procaine penicillin in the feed of broilers throughout their life, either alone or with chlortetracycline, were ineffective.

Supplements to the drinking water for periods of 24 hr. immediately prior to slaughter gave significant extensions of the storage life of uneviscerated carcases. The antibiotics used, in order of effectiveness, were: oxytetracycline, chlortetracycline, tetra cycline, and bacitracin plus neomycin. It was not possible, however, to explain differences in the effectiveness of these antibiotics either in terms of the numbers of the various groups of bacteria present in the viscera or of their metabolic activity.

Starving the birds for 24 hr. before slaughter was also effective in extending storage life, either with or without supplementary antibiotic treatment.—D. H. Shrimpton, E. M. Barnes and W. S. Miller, *J. Sci Food Agric.*, 1958, **9** (6), 353.

QUALITY EVALUATION

Analysis of Coffee Volatiles

A sampling procedure has been developed for the comparative analysis of the volatiles from ground roasted coffee by means of gas chromatography. Preliminary investigations indicated that dry helium was unsatisfactory as a sweep gas, and the use of wet helium was found to give a 3- to 5-fold increase in the amount of sample collected. Although experiments on storage conditions were not performed, this finding is interpreted as indicating that humidity could have a very marked effect on the retention of aroma in stored roasted coffee.

A number of test series were performed, and chromatograms obtained exhibited some 16 distinct peaks. Variations in the peaks with different coffee samples were distinctive and reproducible, and the differences far exceeded the apparent experimental error.

It is suggested that the method will be useful in studying the roasting of coffee, in assessing the quality of different varieties of roasted coffee, and in studies on staling, packaging methods and materials, and instant coffees. It is thought that the method will also be applicable to flavour aroma problems in other foods.—J. W. Rhoades, *Food Res.*, 1958, **23** (3), 254.

BLANCHED VEGETABLES

Peroxidase Test Paper

A test paper has been prepared with the aim of providing a simple and rapid but reasonably accurate measure of the degree of blanching of vegetables by estimation of the residual peroxidase activity. The paper is prepared by immersing filter paper in a mixture of equal parts of 1·0% solutions of *o*-tolidine and urea peroxide. The paper is immersed for just sufficient time for it to become saturated, and then taken out, pressed to remove excess solution, and air-dried. It can be stored over a desiccant under refrigeration in the dark.

The paper is used either by spotting it with vegetable extract or by placing it against the moist surface of a plant substance. The time taken for a blue colour to appear gives an inverse measure of the residual peroxidase activity, which is in turn a good yardstick for the adequacy of blanching. The papers have been compared with the Masure and Campbell qualitative and quantitative tests, and found to be reasonably sensitive; increased sensitivity can be obtained by adjusting the *p*H to a constant figure. No attempt has yet been made to suggest a tolerance or time for colour on the test paper to indicate adequately blanched vegetables, but the study indicates that the test paper offers food manufacturers a rapid and easy means of controlling their processes at this stage.—H. J. Morris, *Food Technol.*, 1958 **12** (6), 265.

Machinery and Equipment

The Brimpex automatic barrel lifter which allows one man to load a lorry unaided.

SELF-ACTUATING LIFTER

A fully automatic barrel-lifter which enables one man, unaided, to load a lorry with 40/45 gallon drums (7 cwt. max.) at up to 250 units per hr. is being made by the Industrial Machine and Equipment Co. (Brimpex), Ltd.

The operator rolls the barrels up the ramps into the machine, and the patented self-actuating method does the rest. The barrels rest against telescopic guides which adjust themselves automatically to the height of the lorry, and are carried up on a roller rotating on sealed ball-bearings. Upon discharge the downward slope of the off-loading ramps gives sufficient impetus to send them to the front of the lorry platform.

As soon as one barrel is discharged the cradle returns automatically to the ground ready for the next load. When one row has been delivered, the operator normally uprights them on the lorry platform before continuing with the next row.

The lifter may be powered by an electric motor (1½ h.p.) or petrol engine. It has 2 rubber-tyred wheels at one end, and a steerable dolly at the other, and may be moved by 1 man.

CAN FILLER

Foodtech, Ltd., have introduced a range of new can filling machines available in capacities from 40 lb. to more than 4 cwt. of sausage mix for continuous filling. Double cylinders allow filling of tins to required weights, from ¼ oz. to 8 lb. The hand-operated model has an output of up to 60 tins per min., while the fully automatic can filler has an output range between 30 to 140 cans per min. Important points are that the machines fill to exact weights and air is excluded. A special adaptor allows for filling jars and square or round tins. In addition synthetic casings up to 20 yd. in length can be filled into portions (e.g., luncheon sausage, polony and saveloys). By the use of a *Poly-Clip* machine, which incorporates a knife attachment for cutting off the end of single portions, each portion can be securely clipped. The whole operation is said to represent a considerable saving in time.

The *Foodtech-Rohwer* can filling machine requires only a little maintenance and is simple to clean according to Foodtech, Ltd. They are also supplying a Rohwer portioning and can filling attachment for use with any power filler where constant pressure is available. This offers the same performance as in the models already described.

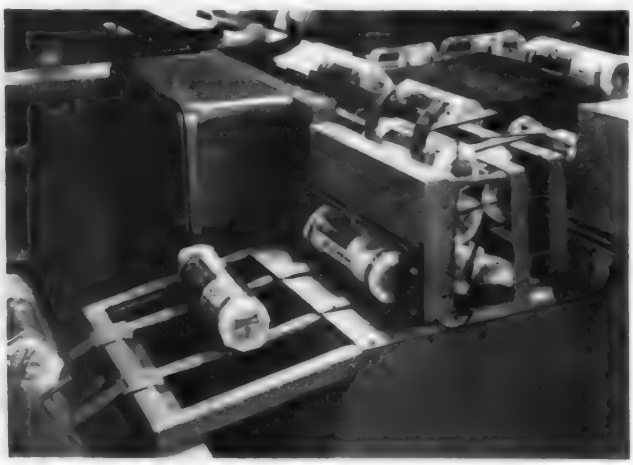
ELECTRONIC CHECK WEIGHER

A new high-speed electronic check weigher is now being made by the Automa Engineering Group, Ltd. The weigher employs a combination of bridge and force balance techniques, by means of which the effects of vibration and temperature variations are cancelled out. As a result, the high performance of 120 weighs a min., at 0·2% accuracy, is said to be achieved under factory conditions.

The tendency of displacement of the platform is detected by velocity and position tranducers, and counteracted by an electromagnetic force; hence no appreciable movement in fact occurs, inertia effects are minimised, and the weighing time is extremely small. The output from the transducers after amplification is applied to the discriminator, which decides whether the object is correct, over, or under weight.

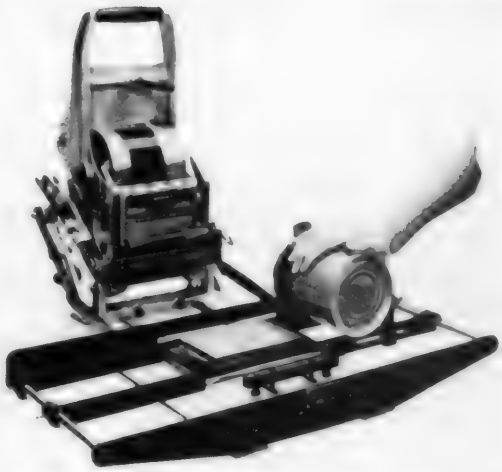
The handling equipment comprises a marshalling system, a magazine, the loading mechanism, the reject system, and an off-loading conveyor. The movement of the loading mechanism is sinusoidal, so that the instant of pick up and release, velocity is zero, thus reducing inertia effects.

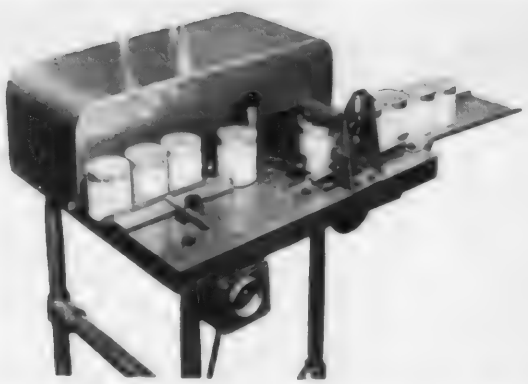
Provision may be made for counting, indicating trend, and recording results. It is also possible to incorporate feed-back systems whereby the



Left: **The Automa check weigher, a high-speed electronic unit.**

Right: **The Foodtech can filler will fill jars and round or oblong tins.**





Left: **The Middlesex Tin Printer, a hand operated machine made by Rejafix Ltd.**
Above: **The C.B. Mark 1 high-speed motorised coding machine which is made by Mark-O-Print, Ltd.**

weigher can control dispensing operations, or processes that effect ultimate weight.

At present, the weigher is finding applications in the packaged food industry, but development with can handling is well advanced, and with tandem heads, it will soon be possible to handle cans at approx. 250 per min.

TIN PRINTING MACHINE

A new machine for printing and over-printing on plain and lithographed tins has been developed by Rejafix, Ltd. Known as the *Middlesex Tin Printer, Model M2/T*, this machine is based on the firm's other *Middlesex 2* models, and although it is hand operated it is claimed that it can achieve a considerable output rate.

The machine incorporates a simple device for feeding the tins which consists of two adjustable rails on which the tins are placed in a pre-set position, indicated by a pointer, before being rolled over the offset pad for printing. It will accomodate tins of from ½ pt. to 1 gal. capacity, and adjustment for different sizes is claimed to be extremely simple.

The machine is said to be extremely useful for printing such information as batch numbers, prices, agents addresses or other variable information which cannot conveniently be printed on to all the cans used at the time of manufacture.

VACUUM MOISTURE TESTER

The moisture content of many organic materials may be estimated within ±0·1% in times varying from 2-12 min. using the vacuum moisture-testing balance made by Townson and Mercer, Ltd.

In this instrument, a 5 g. sample is weighed on torsion balance, in a vacuum, under a beam of infra-red light, and the loss in weight due to evaporation is measured and indicated as a percentage of contained moisture. As the moisture is evaporated it is removed from the instrument by the vacuum. This vacuum not only causes the moisture to be evolved more rapidly but also at a lower temperature than would prevail under atmospheric conditions. This means that many substances may be tested which otherwise might deteriorate under a normal infra-red lamp.

Weighing in vacuum is claimed to overcome both the updraught of heated air and the reabsorption of moisture which can otherwise affect the final result.

On the front panel of the instrument there is a vacuum tap, for evacuating, holding and ultimately releasing the vacuum, a heater control, and a vacuum gauge. The cover, which incorporates the lamp, is counter-balanced and held down by a quick-action catch. An aluminium casting is used to prevent heat from the lamp penetrating to the movement of the balance.

ALL-METAL COUPLING

A flexible power transmission coupling which, despite the fact that it is made entirely from metal, is said to be free from corrosion and does not require any lubrication has been introduced by Metaducts, Ltd. The firm have designated this range *Series CN*.

Single or double bank types are available but at the moment the size is restricted to a maximum bore of 1⅛ in. with a maximum h.p./r.p.m. rating of 0·010.

The couplings, which the makers say are unaffected by either climatic condition or operating temperature, have transmission membranes which may be removed without disturbing the drive or the driven unit and replaced inexpensively.

Transmission membranes can be removed from the coupling without disturbing the driving or driven units and can be replaced for a few shillings.

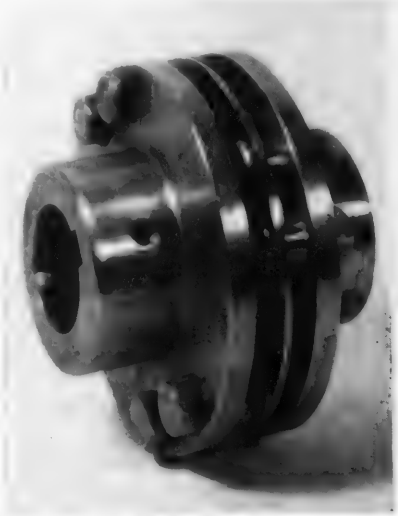
CODING MACHINE

A high-speed motorised coding machine, the *C. B. Mark 1*, has been introduced by Mark-O-Print, Ltd., as a development of their original simpler model, the output and range of which have been considerably increased. The new machine will handle up to 100 articles per min., of a maximum diameter of 3 in.

The machine is trigger operated, the feed being controlled irrespective of the actual loading of the machine. The makers say that the adjustment of both the size and the position of the type are easily carried out. The printing and inking units are also adjustable for printing on recessed or domed bottoms of containers.

Provision is made for manual operation while the machine is being set up and a safety clutch is provided.

A larger machine, the Mark 2, handles articles up to 4 in. in diameter.



A flexible all-metal coupling, made by Metaducts, Ltd.

News Digest

Food Fifty Years Old

An interesting event occurred recently at the laboratories of the British Food Manufacturing Industries Research Association at Leatherhead, Surrey, when tins of food 50 years old were opened for inspection. The food was of British manufacture, and the tins had been found by a United States task force at the site of one of Sir Ernest Shackleton's camps in the antarctic. Shackleton had taken the food with him on the British Antarctic expedition of 1908-1909, and had left it behind at Cape Royd, where it had remained frozen until unearthed by the American force some time ago.

In addition, a tin of soup left behind at Cape Evans by Captain Scott's expedition in the years 1910 to 1913, and two items of British manufacture left behind by a U.S. Service expedition in 1939-41, were also opened.

The examination was carried out at the request of the Ministry of Agriculture, Fisheries and Food, and was attended by Ministry officials, including Mr. J. F. Hearne, F.R.I.C., a principal scientific officer, and by Dr. H. Egan, B.SC., D.I.C., F.R.I.C., of the Department of the Government Chemist.

The preliminary examination of the foods is to be followed by a more detailed examination, but first impressions were highly favourable, and led to the conclusion that the foods were not only edible but in some cases of excellent quality. A tin of kippered herrings, packed in Aberdeen more than 50 years ago by the firm of John Moir and Sons, Ltd. (who ceased operations some 30 years ago!) was described by one of the tasting panel as "real smoked herrings—and not dyed ones." The kippers were found to be somewhat mushy in texture, but this was attributed to their having been roughly handled rather than to their age.

Comments on a tin of tongue packed by the same firm ranged from "not at all bad" to "rather cheesy," but the tongue had an excellent appearance and appeared quite edible. A tin of Rowntree's *Elect* cocoa brought forth particularly favourable comments on its richness, and a sample of Symingtons pea flour ("soup in one minute") could still be used satisfactorily as a basis for a nourishing soup.

The tins were found to be still completely air-tight. None of them had an internal lacquer, but they were protected on the outside by red iron oxide.

Mould on bread

The British Baking Industries Research Association inform us that from enquiries and samples of bread received at the Research Station at Chorleywood it appears that the pinky-orange mould, *Monilia sitophila* is in evidence again this summer. This mould was fairly widespread in 1951 and again in 1955 but is one of the moulds less commonly experienced in the bakery and one which therefore causes more concern when it does appear. Advice on methods of treatment has been given.

Holidays for food manufacturers

Two special autumn holidays have been arranged this year for people connected with the catering, brewing, and food manufacturing industries, by Festival Services, Ltd.

The first tour, by air and coach, leaving London on Sunday, September 28 and returning on Sunday, October 12, is one in a light mood. The party will visit the Rhineland where they will take part in numerous vineyard festivals. This tour also visits the world famous Munich October Festival, the outstanding beer carnival of the world. Three days will be spent in Munich and a special visit has been arranged to one of the leading Munich breweries. The party will also visit the International Groceries and Delicatessen Exhibition in Munich then go on to Neustadt Weinstrasse for the German Vineyard Festival. After seeing two German champagne cellars the party will go on to Brussels and see the World Exhibition before returning home.

The second tour, also fifteen days, leaves London on Sunday, October 19. The highlight of this special holiday is a visit to the German Hotel and Catering Exhibition in Berlin, which this year incorporates an international exhibition of confectionery and food products. Four days will be spent in Berlin so the party will have ample opportunity to visit this exhibition and meet leading German caterers.

Visits to leading breweries in Amsterdam and Hamburg have been arranged on this tour as well as German champagne cellars in the Rhineland. This second holiday ends with two days in Paris.

Society for Applied Bacteriology

At the Annual Meeting and Summer Conference of the Society for Applied Bacteriology, held in Bristol, the following officers of the Society were elected:

President—Mr. D. A. McKenzie; Hon. Secretary—Mr. G. Sykes (Boots Pure Drug Co., Ltd., Microbiology Division, Standards Department, Nottingham); Hon. Treasurer—Mr. G. Elis Jones; Editor-in-Chief—Dr. S. E. Jacobs; Editor—Dr. C. A. E. Briggs; Hon. Publications Manager—Mr. A. H. Walters; Hon. Advertising Manager—Mr. E. J. Mann; Committee—Dr. Eve Billing, Mr. N. J. Butler, Professor E. L. Crossley, Dr. J. G. Davis, Dr. N. R. Knowles, Dr. Jane Meiklejohn, Mr. C. A. Scarlett, Dr. M. Woodbine.

PEOPLE

DR. FRANCIS AYLWARD, Head of the Department of Chemistry and Food Technology at the Borough Polytechnic, has been awarded the Degree of Doctor of Science by the University of Liverpool.

■

MR. T. S. LING and MR. A. C. BUREAU, B.SC., F.INST.PET., M.INST.GAS.E., M.INST.CHEM.E., M.INST.F., two members of the staff of the Balfour Group, have been appointed to the board of directors of Ernest Scott and Co., Ltd., and George Scott and Son (London), Ltd.

Mr. Bureau is also director and general manager of Balfour Lecocq, Ltd., and gas consultant to Henry Balfour and Co., Ltd. Mr. Ling is in charge of the Rietz Division of George Scott and Son (London), Ltd.

*

MR. M. E. O'K. TROWBRIDGE has been appointed managing director and MR. J. J. SERRELL has been appointed to the board of Sharples Centrifuges, Ltd.

Mr. Trowbridge joined Sharples in 1953, and was appointed technical and sales director. He has spent a considerable time in the United States, and travelling elsewhere throughout the world.

Mr. Serrell is a vice-president of the Sharples Corporation, with responsibility for all overseas operations.

■

VISCOUNT TRENCHARD, chairman of T. Wall and Sons (Handy Foods), Ltd., since the formation of that member of the Wall's group of companies in 1956 is to be also chairman of T. Wall and Sons (Meat Products), Ltd. He succeeds Mr. G. D. S. Black now chairman of Mac Fisheries, Ltd.

Lord Trenchard, who is 35, assumed his additional responsibility on August 5. For the past year he and Mr. Black have been jointly responsible for development and co-ordination of Wall's meat interests as joint members of a co-ordinating committee, of which Lord Trenchard has been chairman.

■

MR. GORDON D. S. BLACK, chairman of T. Wall and Sons (Meat Products), Ltd., has been appointed chairman of Mac Fisheries, Ltd., in succession to the late Mr. W. Jackson Wallace.

By his appointment as chairman of Mac Fisheries, Ltd., Mr. Black returns to the company he joined as a management trainee in 1948. After two years he became a director of Bloomfields, Ltd., and in 1954 was also in addition a member of the board of John Woodger and Sons, Ltd., both subsidiary companies of Mac Fisheries, Ltd. On January 1, 1955, he was appointed chairman of T. Wall and Sons (Meat Products), Ltd.

W. V. Smedley

O. J. Bruun

MR. S. J. PENNY has been appointed to the board of Geo. Bassett and Co., Ltd. He has a life-long experience of the confectionery industry, and his knowledge of technical problems has been of great advantage to the company. He will retain his executive appointment as chief engineer and technical manager.

*

Honorary Membership of the Nutrition Society has been conferred on PROF. DR. B. C. P. JANSEN, lately director of the Nederlands Institut vorr Volksvoeding, in recognition of his distinguished contributions to nutritional science. The other honorary members of the Nutrition Society are Lord Boyd Orr, F.R.S., Dame Harriette Chick, D.B.E., Prof. E. V. McCollum and Major-General Sir Robert McCarrison.

■

MR. E. B. WASTELL, general manager of the Selby, Yorks, works of John and E. Sturge, Ltd., has retired at the age of 65. He joined the firm in 1911 to work in the laboratories at Lifford, and later became works manager of the Wheeleys Lane, Birmingham, works, a position he held until the beginning of the last war.

He was largely responsible for setting up the citric acid plant at Selby during 1939-40 and under his guidance the production of citric acid has been increased to five times the original output.

■

MR. F. T. PEARCE, chief accountant of the company, has been appointed secretary of T. Wall and Sons (Ice Cream), Ltd. He succeeds Mrs. M. C. Hoare who remains secretary of the parent company.

MR. E. R. ELWOOD has been appointed manager of the cooked meats and canning department at the Willesden factory of T. Wall and Sons (Meat Products), Ltd. Mr. Elwood, formerly assistant manager in the Willesden bakehouse, succeeds Mr. T. E. Phipps, who has been transferred for other duties at the firm's new Hayes factory.

MR. WALLACE V. SMEDLEY, chairman of the Smedley group of canning and quick freezing companies, has just been appointed to the newly formed Horticultural Marketing Advisory Council by the Minister of Agriculture, Fisheries and Food.

Mr. Smedley, who is the only representative of the food processing and manufacturing industry, was unanimously nominated by the Food Manufacturers' Federation, the National Association of Quick Frozen Food Processors and the Fruit and Vegetable Canners' Association—of which he is chairman.

He will join twenty other council members whose names have already been announced and who represent producers, producers' co-operatives, wholesalers and importers, retailers, consumers' co-operatives and organised labour.

Mr. Smedley, who has spent all his working life in the industry, is generally recognised as one of the world's foremost authorities on food canning and quick freezing. He has travelled extensively studying methods overseas and was himself responsible for installing at the Smedley factory in Wisbech in the 1920's the first automatic pea-canning line in Britain.

In the 1930's he pioneered the commercial production and distribution of quick frozen fruits and vegetables in Britain.

He was elected chairman of the Fruit and Vegetable Canners' Association in 1955.

John Dale group expands

John Dale, Ltd., have acquired Impact Extrusions, Ltd., manufacturers of collapsible tubes.

Impact Extrusions, Ltd., was formed as a private company in 1950 for the initial purpose of manufacturing and selling lead, tin-coated lead, pure tin and their patented tin top tubes to consumers in the United Kingdom and British Commonwealth. In 1954 the first aluminium line was installed.

The company has made great strides and has particularly concentrated on the production of soft metal tubes, specialising in the requirements of the pharmaceutical industry.

Mr. J. W. G. Collins and Mr. S. G. H. Davis from John Dale, Ltd., have joined the board of Impact Extrusions, Ltd., with Mr. O. J. Bruun as chairman, Mr. H. K. Jorgensen as managing director and Mr. Grut as secretary. Mr. Rasmussen remains works manager and Mr. E. R. Robinson, who is well known in other fields of the packaging industry, is sales manager.

As a result of the merger, the John Dale group of companies now claims to be the largest producer of collapsible tubes in the world.

OBITER DICTA

● The principal source of vitamin C for schoolchildren is potatoes. No alternative we know is of any use.—*Dr. Stross*, M.P.

● There will always be a Smithfield as long as there is an East End and a West End, a best end and a scrag end.—*Mr. Spencer Tribe, union leader.*

● I cannot help but notice how in restaurants people tend to souse food and even soup with vinegar. Quite small children are given liberal doses.—*Letter in Daily Express.*

● Preservation of grass by irradiation is the latest essay in keeping food fit to eat. . . . So even cows and sheep are threatened, it seems, with the possibility that their food will all be canned in the future.—*Daily Telegraph.*

● July is "National Hot Dog Month" in the U.S.A. and to mark this the American Meat Packaging Industry, as a gesture of goodwill to our Meat Industry, presented a gold-plated hot-dog to the British Food Attaché in Washington. A handing-over ceremony will take place during the Food Fair at Olympia.—*Press Release.*

● The Japanese Government's brewing laboratory is reported to be making good progress with the development of dehydrated alcoholic drinks which can be marketed in collapsible containers. It is hoped in Japan that the process will enable distillers to give a 30-year flavour and smoothness to whisky in a matter of weeks.—*Aluminium News.*

● Alas! In the matter of sausage casings we seem to be well behind the U.S.A. in achievement—in the ability to look ahead, so to speak. If the 10 million hot dogs eaten in the U.S. last year would, lying end to end cover 800,000 linear miles, it seems by my calculations that each hot dog measures 140 yd. long.—*E. St. J. Heigh, Press Officer, F.M.C.*

● The age of chivalry is not dead. In Germany, a business man has undertaken to stem the flow of tears of wives and young maidens—while they are peeling onions. The shining armour of this modern knight is a collapsible tube, in which he markets onion paste.—*Aluminium News.*

News for Importers

Seed oysters imports.—The Board of Trade are considering an application for the exemption from duty of imported seed oysters, *i.e.* oysters in shell imported between March 1 and May 31.

Imported cherries.—The Treasury have made the Import Duties (Exemptions) (No. 11) Order, 1958, which exempts certain preserved cherries from the general *ad valorem* duty of 10% chargeable under the Import Duties Act, 1932.

The Order was published as Statutory Instruments 1958, No. 1014.

Starch duty.—The Treasury have made the Import Duties (Drawback) (No. 9) Order, 1958, which provides for the payment of drawback of Customs duty on maize starch or milo starch used in the manufacture of certain exported liquid glucose.

The Order was published as Statutory Instruments 1958, No. 974.

Honey.—A further quota of £80,000 f.o.b. has been established for the import of honey from dollar sources during the period July 1, 1958 to June 30, 1959. This quota incorporates the previous separate quota for imports from Cuba.

Details are given in Notice to Importers No. 853 issued by the Import Licensing Branch of the Board of Trade.

Fresh pear imports.—The quota for the import during the period July 1 to December 31, 1958, of fresh pears originating in and consigned from Western European and certain other countries will be £1,175,000 c.i.f., the same as for the corresponding period of 1957.

Details are given in Notice to Importers No. 862 issued by the Import Licensing Branch of the Board of Trade.

Dollar fruit imports.—The Board of Trade proposes to establish commercial quotas for the import of all fresh, dried and canned fruit from the dollar area during next season. The quotas will have a total value of about $20 million f.o.b. a year. It is not intended to make any further arrangements for imports of fruit from the United States of America under U.S. Public Law 480.

Bottled apples and canned apples.—Imports of bottled apples and canned apples originating in and consigned from the "relaxation countries" (chiefly O.E.E.C countries and their dependencies) will be permitted in the twelve months ending June 30, 1959, to the same value as in the twelve months ended June 30, 1958. The value of the quota is £600,000 c.i.f.

Details of the licensing arrangements are given in Notice to Importers No. 859 issued by the Import Licensing Branch of the Board of Trade.

Cheese imports from North America. Imports of natural cheese from North America will again be permitted in the twelve months beginning July 1, 1958, to the same value as in the four previous years (£1·5 million). Licences will as hitherto be valid for imports from both Canada and U.S.A.

Details of the licensing arrangements are given in Notice to Importers No. 858 issued by the Import Licensing Branch of the Board of Trade today.

Lemon juice.—The Board of Trade announce that, in view of the difficulties now being experienced by processors in obtaining lemon juice from European sources, a special quota of $850,000 f.o.b. has been established for the import of lemon juice in wholesale pack originating in and consigned from the United States of America.

Details are given in Notice to Importers No. 864 issued by the Import Licensing Branch of the Board of Trade.

Apples.—The Board of Trade announce that the quotas for the import of fresh apples from Western Europe and certain other countries and from North America have been amalgamated to form a single quota, which will be on a weight basis. The amount of the new combined quota is 1,500,000 cwts., of which 300,000 cwts. may be imported in the new period July to December and 1,200,000 cwts. in the period January to June.

A Notice to Importers giving details of the arrangements will be issued shortly by the Import Licensing Branch of the Board of Trade.

Importation of Fruit.—The Minister of Agriculture, Fisheries and Food has made an Order entitled the Importation of Plants (Amendment) Order, 1958, which is now in operation. It imposes restrictions on the importation of apples, apricots, greengages, nectarines, peaches, pears and plums grown in any European country except Belgium, Denmark, Finland, Luxembourg, Norway, Sweden, and the Netherlands. Each consignment landed in England or Wales must be accompanied by a phytosanitary certificate in the form set out in the Second Schedule to the Importation of Plants Order, 1955 (S.I. 1955/81). Consignments must be examined before despatch, be found free from San Jose scale and substantially free from all species of Lepidoptera.

Copies of the Order (S.I. 1958 No. 1138) may be obtained from H.M.S.O., price 3d.

New Q & Q distributors

Townson and Mercer, Ltd., have been appointed by Quickfit and Quartz, Ltd., as official home market distributors and stockists for their laboratory glassware.

A Farmer and his Shop

In the town of Aylesbury, Buckinghamshire, is a newly opened self-service store which, although small perhaps in comparison with some of the larger multiple super-markets, has a charm and efficiency of its own, and is as up-to-date as any in England.

The main object of this store, which is called "Farmfare" and actually owned by a farmer, is to provide customers with mainly locally-bred meat which is pre-packed on the premises. Down one side of the store are two refrigerated self-service cases which are devoted to meat cuts of every sort, each clearly marked with the weight, price and a description of the meat. Above the cabinets are colourful cutouts showing the various joints and how to recognise them.

Other foodstuffs are not forgotten; there is a delicatessen counter in which is incorporated a 3 ft. refrigerated case, at the far end of the store, whilst opposite the meat cases is a frozen food case and a pre-packed food case which offers a very varied selection. Tinned, bottled and other non-perishable goods are displayed all round the store, ready for the customer to select. The refrigerated cases are operated by Prestcold equipment incorporating Super Presmetic units.

The accent is on hygiene in the cutting and packaging room situated below the store, where two butchers and two girls are employed. The meat is stored in a Prestcold 850 cu. ft. coldroom, the equipment for which includes the Prestcold "Defrostermatic," which, installed outside the coldroom, eliminates all the labour which is required with manual defrosting. As with the other equipment in the store, defrosting takes place automatically, at regular intervals, without any attention from the staff.

The design and construction of the store were carried out by the Bedford Refrigeration Co., Ltd., distributors of Prestcold equipment.

British Cellophane move

British Cellohane, Ltd., have moved into new London offices. Their address is now Henrietta House, 9, Henrietta Place, London, W.1. (Telephone: Museum 8311).

The building will house all BCL staff at present in 12-13, Conduit Street and 20, Savile Row, W.1. The London staff of Colodense, Ltd., and Bonded Fibre Fabric, Ltd., associate companies, will also move to this address.

The new offices will allow the company to extend and improve their services. A demonstration room will be set up at Henrietta House. Here, visitors will be able to see how to make the best use of *Cellophane* cellulose film, BCL polythene film, *Polycell* polythene-coated cellulose film and other flexible transparent materials. They will be able to study examples of the successful application of films in packaging and other fields, attend demonstrations of techniques in handling these materials and obtain expert advice on all aspects of their use.

New premises

Padley and Venables, Ltd., of Birmingham, are removing to new and larger premises at Middlemore Lane West, Aldridge, Nr. Walsall. This branch of the company specialises in the processing of stainless steel.

ERECTIONS AND EXTENSIONS

E. M. Robinson, Ltd., are having a tripe preparing factory built at Pottery Lane, Newcastle-on-Tyne.

*

The Nestle Co., Ltd., are having a warehouse built at Trinity Wharf, London, S.E.16, at a cost of £18,000.

*

J. and H. B. Ibbotson are planning to build a cooked meats factory on a site at Nile Street, Sunderland, Co. Durham.

*

H. Cohen and Co., Ltd., flour factors, are planning to build a warehouse and office premises at Greatorex Street, London, E.1.

*

H. P. Bulmer and Co., Ltd., have plans in hand to erect extensions to their cider factory at King's Acre Road, Hereford.

*

H. J. Heinz and Co., Ltd., are having a food distribution depot built on the Bridlington Estate, Bristol, at an expenditure of £50,000.

*

J. Wilson Brothers, Ltd., produce merchants, are having an extension erected to their warehouse at Brinkburn Street, Newcastle-on-Tyne.

*

W. and R. Jacob (Liverpool), Ltd., are having a biscuit warehouse and distribution depot built at Southwell Road West, Mansfield, Notts.

*

Thomas and Evans, Ltd., are planning to extend their mineral water factory at Duntshill Road, London, S.W. 18, at an estimated cost of £40,000.

*

Cornwall Co-operative Bakery (Western), Ltd., are having a bakery constructed at North Roskear, Camborne, Cornwall. It is expected that production will begin in September.

*

L. Morris (Boxes), Ltd., cardboard box manufacturers, 14, Regents Row, London, E.8, are planning to build a factory on a site at Cheap Lane, E.8.

*

Keens (Watford), Ltd., manufacturing provisioners, are planning to reorganise and extend their production and storage units at Marlborough Road, Watford, Herts.

Food News Overseas

Danish milk plant

Anhydro A/S, of Copenhagen, have delivered a spray drying plant, designed for the production of milk powder, to United Dairies, Ltd. According to Anhydro's own estimate, the plant is the biggest in Europe and probably in the world. It has a capacity of approx. 4,000 lb. milk powder per hr., and has cost about £40,000.

Anhydro A/S, who have now been in operation for 10 yrs., have in that time sold equipment throughout the world. In addition to their main factories, they maintain research laboratories near Copenhagen, where several interesting new powder products, including a seaweed flour fodder, are said to have been developed.

Australian wine

Five wine companies each have plans for major new wine-grape growing developments between Waikerie and Cadell, on the River Murray in South Australia. Three, and possibly four, new wineries are likely to be established in that area.

A sixth company will continue the expansion made in recent years at its existing, winery and distillery at Cyrilton, close to Waikerie.

The companies, whose holdings range from 2,000 to 100 acres, plan their own independent pumping systems to irrigate their land.

Grape varieties include the Standard varieties for the Murray Valley, as well as varieties for brandy and Palamino grapes for dry sherry.

Polish game exports

Among Polish food products exhibited at this year's Poznan Fair by the agency which handles export and import of foodstuffs was a range of game products. This was the first occasion on which these were shown, and the marketing agency, Animex, hopes for considerable export orders. Deer, wild boar, and hare are widely hunted in Poland, and specialities now offered for export include hare pie, brawn goulash, venison fillets, and game sausages, as well as live snails.

The trading turnover of the Animex agency (including non-consumable animal products as well as foodstuffs) in 1957 was 114 million dollars: 88·7 m. dollars export, and 21·3 m. import. Great Britain is one of the main customers for food exports, taking as she does 35% of Animex exports, in the form of bacon, ham and meat and fish conserves.

Turkish sugar factory

The foundation stone of a factory designed to produce 20,000 tons of refined beet sugar a year was laid recently at Ankara. There will be a large farm attached to the factory, and the Central Sugar Institute for Turkey will also be located there.

Uganda's first African-owned coffee factory

Uganda's first coffee factory to be owned by a group of African growers all farming and owning separate shambas has been opened at Masaka, reports Barclays Bank D.C.O.

The factory has an output of six tons of clean coffee per day and the first consignment fetched the high price of £291 10s. per ton. Under a recently amended ordinance permitting groups of farmers to combine in processing and exporting coffee under their own trade mark, 42 applications to build estate coffee factories have been received.

Symposium on cottonseed

A symposium on "Cottonseed and its by-products" is to be held from December 5 to 7, 1958, at the Regional Research Laboratory, Hyderabad, India. Subjects will include agricultural aspects; the processing and storing of seed and oil; refining, hydrogenation, and solvent extraction of the oil, and by-products. Papers will also be read on fundamental studies and statistics. Industrialists, scientists and government officials from a number of countries in Europe, Asia, and America have been invited.

More meat in U.S.

More meat for the table is in prospect for U.S. housewives, according to the latest Government figures. These indicate that meat supplies, especially pork, should increase this autumn and continue to rise in 1959. This is a reversal of the downward trend that began two years ago, and continued to a point where meat supplies are now 11% below those in 1956.

Per capita consumpton of meat this year will be about 151 lb., whereas two years ago it was 165 lb. Producers and ranchers are said to have reduced their cattle and hog marketing this year in order to increase their breeding stocks.

Technical Press Review

September

Manufacturing Chemist.—Work Study and Piping Design; Pipe Stressing; Pipe Layout; Wetting Agents for Agricultural Sprays; The Synthesis and Applications of Acyl Halides; Progress Reports: Hormones; Antibiotics; Perfumery and Essential Oils; Disinfectants and Disinfection.

Dairy Engineering.—Dairy Wastes: Disposal by Balanced Biochemical Bio-Oxidation; Purity of Water for Use in Dairies; The Measurement of the Colour of Sterilised Milk; Repair and Renovation of Fractional Horse Power Motors; Preventing Corrosion in the Dairy Industry.

World Crops.—Plant Nutrients and Stimulants: A Complete Fertiliser; Fertilising Forest Trees; Potash Manuring; Organic Irrigation; A Trace of Copper.

Atomics.—Special Issue for the Geneva Conference of Peaceful Uses of Atomic Energy; The Significance of Geneva; Nuclear Energy in the Services of Mankind; How Radiation Damages Metals; Isotopes Measure Engine Wear; The Selection of Reactor Coolants; The Commercial Exhibition at Geneva; Governments Show their Wares.

Public Works and Muck Shifter.—The Construction of Water Reservoirs and Wells; Belt Conveyance of Spoil.

Building Materials. — External Facing Materials for Public and Industrial Buildings, Offices and Flats.

Paint Manufacture.—High Polymer Conference Report; Aluminium; Versatile Pigment—1; Fading of Printing Inks—2; Epoxide Resins.

Automation Progress.—Continuous Heat Treatment with Automatic Control; Recognition of Characters Printed in Magnetic Ink; Feeding Data to Machines—To Read or to Punch? How Lloyd's Use Punched Card Machines; The Design of Automatic Machine Tools for Automatic Control; Business Efficiency Exhibition Preview.

Chemical Processing and Engineering.—Materials Handling in the Chemical Industry: Pneumatic Handling; Liquid Handling; Conveyor Developments; Uranium from Lignites.

Petroleum.—Belayim Crude—The Advantages of Coking (II); Applications of the Unisol Process in Great Britain; Arrangements of Compressors for Mineral Oil Deposits; Fresh Air; Mud Pumps.

Specimen copies are available by writing to The Publishers, Leonard Hill House, Eden Street, London, N.W.1.

Packaging

New biscuit pack

A new wrapping for their ½ lb. packets of *Marie* biscuits has been brought out by Scribbans-Kemp (Bakeries), Ltd. Of the direct-wrap type, it is of clear blue vegetable parchment and bears a photogravure reproduction of the biscuits.

It is a 4-colour printed pack and use is made of bold white printing for the name Kemps. The packet has an overwrap of *MXXT Cellophane* which prolongs the shelf-life of the biscuit.

The weight and price remain the same.

Irradiated polythene tapes

An agreement has been concluded whereby a full range of irradiated polythene tapes, developed by the Tube Investments Research Laboratories, will be made and marketed by B.X. Plastics.

Special sizes and thicknesses of tapes will be produced. They are to be processed on the high energy accelerator belonging to Tube Investments. Research and development work on applications of the tapes are to continue.

High energy radiation is believed to increase the resistance of polythene to high temperatures and stress cracking.

Polythene-lined satchels

John Dickinson and Co., Ltd., have introduced a gusseted satchel evolved from their *Weldex* polythene-lined pockets.

The new satchel is stated to give greater bulk capacity and is known as the *Protecta* bag. It is constructed of bleached kraft (of any standard weight) laminated to polythene. The centre seam is welded polythene to paper and the bottom is first welded and then turned up and gummed for double security.

Protecta polythene-lined satchels are used for Standard Brands' dessert powders

The new flush-top bag can be manufactured in any size between certain defined limits. In the smaller sizes the makers say it is a secure, highly moisture-vapourproof, greaseproof and powder-tight pack. At the other end of the scale, in the large sizes, its protectiveness and strength commend it to economy-size packers.

Readily heat-sealed on normal equipment, the new laminated satchel has a rigidity on the filling machine, given to it by the paper. Its kraft face can be 4-colour printed by the aniline process or in 2 colours aniline and 2 photogravure.

The *Protecta* satchel is already being used by Standard Brands, Ltd., for packaging their strawberry-flavoured table dessert, a product too hygroscopic to be satisfactorily packed in ordinary carton liners.

Black pudding casing

A cellulose casing for black puddings known as *Black Nojax*, has been introduced by Viskase, Ltd.

It is supplied in 40 ft. lengths shirred up to a length of 9 in. ready for continuous dry stuffing and, according to the makers, the casing is much easier to handle than either animal or flat cellulose casings.

Puddings filled in the casing are uniform in diameter and are said to be completely clean to handle.

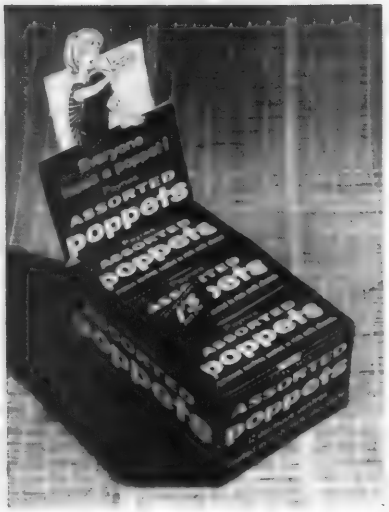
Exporting chocolate couverture

The Caxton Chocolate Co., Ltd., have developed an "American Pail" type of steel drum for exporting ice cream couvertures. This was developed in answer to the problem encountered with the solid block export pack which could not reach tropical and sub-tropical destinations without melting.

The liquid chocolate is poured into a polythene bag, which is already set in the drum, and the bag is bunch sealed. The lid is then sealed with a special closing tool, and the drums are then despatched to the docks without waiting for the chocolate to set.

The drums are fitted with a bucket-type handle. It is claimed that they are practically damage-proof and difficult to pilfer.

The new pack for Kemp's Marie biscuits has a blue ground and is over-wrapped with moisture-proof Cellophane.



New ideas in point-of-sale appeal. The counter packs for Payne's Poppets have been printed in different colours to identify different flavours in the range. The new show card for Lovell's Milky Lunch, is lithograph printed in 5 colours, blue, yellow, red, white and brown. The Batchelor showcard features an attractive grill served with the company's peas.

Upon arrival at their destination, the drums are placed in a warm room overnight, and the chocolate is liquid enough in the morning to be poured into the user's kettle.

It is pointed out that the drums are easily stacked and may be sold after use.

Paper laminates

The Plastics Division of the Telegraph Construction and Maintenance Co., Ltd., has developed a new range of laminates with possible applications in food packaging. The laminates combine paper, polythene and hessian.

By extrusion coating a hessian mesh is firmly sealed to a layer of polythene which completely covers the mesh. The result is a material which is stated to be strong mechanically and proof against moisture. It will also stand up to temperatures of up to 140°F. without deterioration and can be subjected to temperatures near 200°F. for short periods.

By varying the mesh, the type of paper, and the thickness of the polythene layer, a number of different laminates of this character can be made to suit individual requirements. A sandwich construction with paper on both sides of the hessian mesh is reported to offer the greatest possibilities.

Three varieties are at present being offered, all in 36 in. widths.

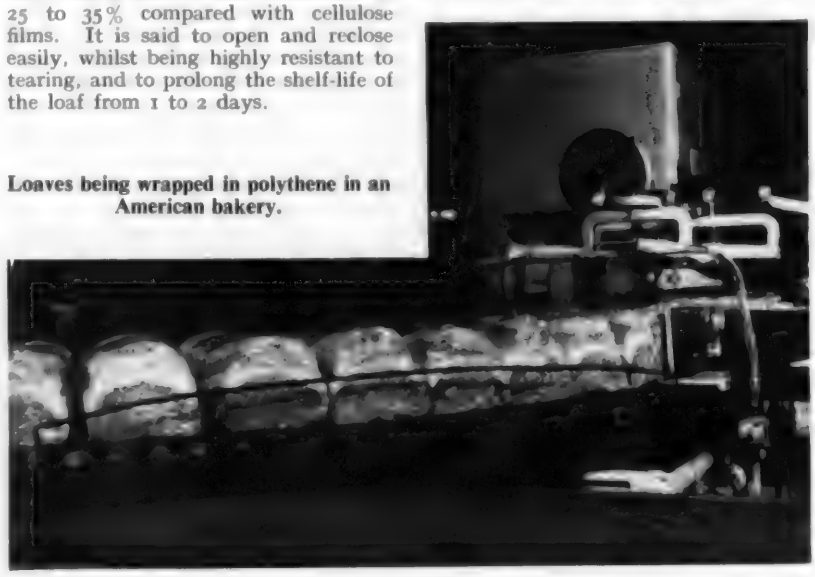
Protective wrapper

A new coated paper or board wrapping has been produced by George Stark and Sons, Ltd. This new material is believed to have wide applications as it is said to offer great resistance to water, water vapour, gases, odours, oils, fats and most chemicals.

The product is known as *Grovepac* paper or board, and is available in a wide range of qualities and with varying thicknesses of the coating agent, which is based on polyvinylidene chloride. The coated side, which is harmless to foodstuffs, is normally placed in contact with the material being wrapped, leaving the other side for printing and decorative treatment. The makers say that it is suitable for use on automatic machinery and may be heat-sealed.

Polythene bread wrap

The softness of polythene has long made it a desirable wrapping material for bread, but the film's lack of clarity, and certain heat-sealing difficulties, have until now precluded its use for this purpose. However an American organisation, the Western Waxide Division of Crown Zellerbach Corporation, have now developed a grade of polythene, *Crown-Seal* which is said to be entirely suitable for wrapping bread. The film is described as pliant, strong, crystal clear, and extremely soft, and is said to offer economies of 25 to 35% compared with cellulose films. It is said to open and reclose easily, whilst being highly resistant to tearing, and to prolong the shelf-life of the loaf from 1 to 2 days.



Loaves being wrapped in polythene in an American bakery.

An attachment for AMF wrapping machines has also been developed to handle the new film. The film is heat-sealed, and special end labels have also been developed in order to improve the seal even further.

The wrap has been extensively tested on the products of a large bakery in California, and results are claimed to have shown a very ready customer acceptance of the new wrapper.

Egg-packing machine

A machine designed for closing moulded pulp egg containers by stapling has recently been developed by Lawtons of Liverpool, Ltd. Known as the *Lawco-Egpak*, it is operated by a treadle, one stroke affixing 3 staples at once to secure an 18-egg tray, whilst only one staple is used when fixing a 6 egg tray.

The front plate of the machine is designed to accept and position each tray for accurate and speedy fixing.

Trade Marks

DAIRYGLEN.—766,282. Oats included in Class 31; and fresh fruits and vegetables. **London Grocers, Ltd.,** Crossbrook Street, Waltham Cross, Herts.

JIF.—755,393. Non-alcoholic drinks and preparations for making same, all included in Class 32; and fruit juices. **Reckitt and Colman, Ltd.,** Kingston Works, Dansom Lane, Hull, Yorks.

PALEFACE.—759,040. Non - alcoholic drinks and preparations for making same, all included in Class 32; and fruit juices. **Ozonic, Ltd.,** Westwood, Broadstairs, Kent.

SPRINGWATER.—765,123. Preserved fruits and preserved vegetables. **Erith Meat Products, Ltd.,** 44, South Road, Erith, Kent.

WINNIE WILTS.—767,921. All goods included in Class 29. **Wilts United Dairies, Ltd.,** Bythesea Road, Trowbridge, Wilts.

CARRS SPORTS.—765,623. Biscuits (other than biscuits for animals). **Carr and Co., Ltd.,** 54, Church Street, Carlisle.

CHOCOLATE SPORTS.—765,624. Chocolate biscuits. **Carr and Co., Ltd.,** 54, Church Street, Carlisle.

KERB STOPPERS.—766,404. Non-medicated confectionery. **Sweetule Products, Ltd.,** Church Street, Radcliffe, Manchester.

WINNIE WILTS.—767,922. All goods included in Class 30. **Wilts United Dairies, Ltd.,** Bythesea Road, Trowbridge, Wilts.

UANDME.—769,057. Non - medicated sugar confectionery and chocolate. **Robertson and Woodcock, Ltd.,** Trebor House, Woodford Avenue, Ilford, Essex.

JAMWICHES.—769,374. Biscuits (other than biscuits for animals). **Alfred Hughes and Sons, Ltd.,** Savoy Biscuit Factory, Bordesley Green Road, Birmingham, 9.

SPARKIES.—769,808. Cereals and preparations made therefrom, all for food for human consumption. **Quaker Oats, Ltd.,** Bridge Road, Southall, Middlesex.

MAWM.—769,834. Biscuits (other than biscuits for animals). **William MacDonald and Sons (Biscuits), Ltd.,** Glengarry Biscuit Bakery, Earl Haig Road, Hillington, Glasgow, S.W.2.

WINCO.—767,436. Feeding stuffs for animals. **Winchcombe Flour Mills, Ltd.,** Town Flour Mills, Winchcombe, Gloucs.

WEANALAC.—767,574. Animal feeding stuffs containing milk. **Brooks (Mistley), Ltd.,** The Maltings, Mistley, Manningtree, Essex.

SUN - LEM.—768,316. Non - alcoholic drinks and preparations for making same, all included in Class 32; and fruit juices. **Optrex, Ltd.,** 17, Wadsworth Road, Perivale, Greenford, Middlesex.

WATERFALL.—762,756. Dried, preserved and canned fruits and vegetables; lentils included in Class 29 and desiccated coconut. **Williams Bros.' Direct Supply Stores, Ltd.,** 146, Holloway Road, London, N.7.

GALLEON PRIDE.—766,743. Butter. **The Modern Butter Packers, Ltd.,** Littleport Street, King's Lynn, Norfolk.

SPORTS.—765,625. Biscuits (other than biscuits for animals). **Carr and Co., Ltd.,** 54, Church Street, Carlisle, Cumberland.

LIMELIGHT.—767,306. All goods in Class 30. **Glacier Foods, Ltd.,** Industrial Estate, Maidenhead, Berks.

PRINCESS.—761,098. Mint - flavoured sugar confectionery (not medicated) and chocolate-coated toffees, but not including marshmallows. **Waller and Hartley, Ltd.,** 34, Birley Street, Blackpool, Lancs.

FONDOVA.—763,950. Sugar; flour, preparations made from cereals for human consumption; bread, biscuits (other than biscuits for animals), cakes, pastry; and non-medicated confectionery. **Fondova, Ltd.,** trading also as **Fondova,** 35, Claybrook Road, Hammersmith, London, W.6.

AMYLEXA.—765,917. Enzymic malt products containing alpha amylase for use in the baking and confectionery trades. **The British Malt Products Co., Ltd.,** Lothian House, 1, Leather Market Street, London, S.E.1.

"SONNETS."—768,429. Non-medicated sugar confectionery and chocolates. **Robertson and Woodcock, Ltd.,** Trebor House, Woodford Avenue, Ilford, Essex.

MAXADE.—769,373. Non - alcoholic drinks and preparations in the form of crystals for making such drinks, all included in Class 32. **The Maxilin Marketing Co., Ltd.,** Maxilin House, Sharples Vale, Astley Bridge, Bolton, Lancs.

CORONA LIMORONA.—757,459. Non-alcoholic drinks and preparations for making same, all containing lime juice or lime essence and included in Class 32. **Thomas and Evans, Ltd.,** 24, Hannah Street, Porth, Glams.

SUNCROWN.—767,551. All goods in Class 32. **Thomas and Evans, Ltd.,** 24, Hannah Street, Porth, Glams.

DAB-O-LICS.—768,034. Non-medicated sugar confectionery. **Dunhills (Pontefract), Ltd.,** Hardwick View, Tanshelf, Pontefract, Yorks.

MARZONIA.—768,322. Marzipan. **Gordon Walker and Co., Ltd.,** Basingstoke Road, Reading, Berks.

GOLDEN LEA.—766,982. Tomato juices, fruit juices and fruit cordials (non-alcoholic). **Tim Piper, Ltd.,** 192, Nepean Highway, Gardenvale, State of Victoria, Australia.

CIRIO BRAND TOMATO JUICE. 757,201. Tomato juice. **Societa Generale Delle Conserve Alimentari Cirio Gia P.C. Cirio - Bandini - Narizzana and Signorini,** Via Signorini San Giovanni a Teduccio, Naples, Italy.

KUS.—771,623. Preserved, canned and dried fruits; and canned vegetables, canned fish and canned meat. **Kniveton, Uren and Sons, Ltd.,** 37, Victoria Street, Liverpool, 1.

CARMEL PRIDE.—772,617. Fruits and vegetables, all being cooked, canned or preserved. **Canners Agencies, Ltd.,** Plantation House, Fenchurch Street, London, E.C.3.

BUTTA - CREST.—B775,746. Cheeses. **John Arthur Barnsdall,** trading as The Richmond Dairy, 32, Ransom Road, Nottingham.

BLUE DANUBE.—770,768. All goods included in Class 30, but not including chocolates or any goods of the same description as chocolates. **Gloria Products, Ltd.,** 125, Parkway, Regent's Park, London, N.W.1.

TUNNOCK'S JOCKLET. — B774,294. Chocolate biscuits. **Thomas Tunnock, Ltd.,** 43, Main Street, Uddingston, nr. Glasgow.

MAGIC MOMENTS.—775,884. Chocolates, chocolate and non-medicated confectionery. **A. S. Wilkinson, Ltd.,** Cremona Park, Benton Road, Newcastle-on-Tyne.

New Companies

Alexander and Wood (Frozen Foods), Ltd. (603513.) 50, Close, Newcastle-on-Tyne. £10,000. Dirs.: Christopher R. and Wm. G. Wood, and Harry E. Scorer.

Bakery Export Supplies, Ltd. (602275.) 41-2, King William Street, London, E.C.4. £1,000. Dirs.: G. E. Drury, L. S. Pool, F. A. and G. F. Thienel.

Best's Sausages (Orpington), Ltd. (603690.) 89, High Street, Orpington. £100. Permt. dirs.: F. S. Burton and S. B. Best.

Canned Foods, Ltd. (603438.) £2,000. Subs.: Guy W. Beck, 21, Lime Street, London, E.C.3, and Donald H. Goddard.

Clovers, Ltd. (602929.) Millers and flour, bran, breadstuff, meal, oilcake and other foodstuff mnfrs. and mchts., etc. £100. Subs.: Elizabeth Tuck and Marion Long, 59-67, Gresham Street, London, E.C.2.

A. Davis (Bridgend), Ltd. (602559.) "Westgate," Ogmore-by-Sea, Glam. Bakers and confectioners. £1,000. Dirs.: Arthur H. N. and Mrs. Dorothy S. Davis, and S. T. John.

Farmer's (Isle of Wight), Ltd. (603003.) 98, Sandown Road, Lake, Sandown, I.W. Bakers, pastrycooks, confectioners, etc. £2,000. Dirs.: Edward W. and Edward H. Austin.

F. A. Halliwell and Son, Ltd. (602572.) 31, Lloyd Street, Albert Square, Manchester, 2. Bakers, pastrycooks, etc. £1,000. Dirs.: F. A., Mrs. Audrey, and Keith Halliwell.

High Melton Produce Co., Ltd. (602577.) College Hill Chambers, London, E.C.4. Pea-vining contractors and pre-packers, etc. £1,000. Dirs.: Wilfred and John W. Blundell.

Hopper's Bakeries, Ltd. (600280.) 80, Wincheap Street, Canterbury, Kent. £10,000. Dirs.: Horace Hopper and Peter E. Hopper.

Huffkins, Ltd. (599951.) Bay Tree Hotel, Burford, Oxon. Mnfrs of and dealers in sweetmeats, etc. £2,000. Dirs.: Sylvia M. Gray and Ruth L. Johnstone.

Jaspar Confectionery, Ltd. (602890.) To carry on the business of mnfrs. and dealers in chocolates, sweets, confectioneries, etc. £1,000. Subs.: Linde Lee, 73, Longridge Road, London, S.W.5, and J. F. Lintott.

Fred Jones (Bakers), Ltd. (602397.) 49, Paddock Lane, Walsall. £5,000. Dirs.: Fred Jones, Sr., Fred Jones, Jr., and G. S. Jones.

Lewis Bros., Ltd. (603664.) 8, Larkhill Street, Blackpool. Butchers' sundriesmen, sausage casing mnfrs., etc. £1,000. Permt. dirs.: Edward J. and Bernard A. Lewis.

O. G. Morgan and Son, Ltd. (603132.) Maesgwyn, Bryncethin, nr. Bridgend, Glam. Mnfrs. and dealers in butter, margarine, lard, etc. £2,000. Dirs.: Owen G., Olwen and Alan Morgan.

Herbert Nicholson, Ltd. (602173.) Lake Road, Windermere. To take over the business of bakers and confectioners carried on as "T. H. Nicholson," at Windermere, etc. £4,000. Permt. dirs.: T. H. Nicholson, K. R. Gorton, Ethel Nicholson and Ethel Gorton.

These particulars of new companies recently registered have been extracted from the daily register of Jordan and Sons, Ltd., Company Registration Agents, 116, Chancery Lane, London, W.C.2.

Recent Patents

COMPLETE SPECIFICATIONS ACCEPTED

799,258. NORTHERN DAIRY ENGINEERS, LTD., and J. W. SHEARMAN: Method and apparatus for preparing citrus fruit beverages and concentrates.
799,347. T. HEDLEY AND CO., LTD.: Lard shortening.
799,478. GOODYEAR TYRE AND RUBBER CO.: Packaging of freshly cut red meats.
800,105. O. G. HOYER: Filling machine for ice cream freezing.
800,422. BAKER PERKINS, LTD.: Panning of dough pieces.
800,523. B. C. HANSON: Food mixing machines.

ABSTRACTS OF BRITISH PATENTS

Bread handling apparatus

This invention relates to the simultaneous loading of tins on to and from the trays of bakery ovens of the type which have a means for keeping the trays level throughout the length of the conveyor path.

The apparatus has spaced loading and unloading surfaces, in horizontal alignment, disposed so that the conveyor trays may pass between them. A horizontally movable transfer means which travels in a path above the surfaces engages, during its journey from a retracted position, an article on a conveyor tray and an article on the loading surface and moves them respectively from the tray on to the unloading surface means and from the loading surface means on to the loaded tray.—796,025. *Baker Perkins, Ltd.*

Prepared infants' milk

The principal object of the present invention is to provide a proteinacious product which will improve the growth and nutritional state of infants who suffer from poor appetite, sub-optimal growth and impaired nutrition, and who are in periods of active protein anabolism. Another object is to provide a milk additive which, when added to milk or the protein materials derived from milk, provides these advantages.

A prepared milk conforming to the foregoing may be made by adding the essential amino acid L-lysine to whole milk or the protein material of the milk. The amount of free L-lysine to be added to the whole milk is equivalent to 0·02 to 0·13% by weight, the preferred amount lying in the range 0·05 to 0·10%. The amino acid may be added to skimmed liquid milk or milk powder, evaporated milk, condensed milk or other commercial milk product in an amount equivalent to 0·59 to 3·8% by weight of the protein being enriched, the preferred range being 1·5 to 3%.

Various essential vitamins and minerals such as calcium and iron salts may be incorporated along with the lysine. The combined mixture, it is said, will give the patient the nutrient factors frequently required in supplementary quantities all in one source.—797,298. *White Laboratories, Inc.*

Ice cream

This invention concerns a process for the manufacture of ice cream in which a small quantity of water-soluble alginic acid amide is incorporated into the ice cream composition.

It is stated that at least 40%, and preferably 60% to 100% of the carboxyl groups present in the molecule of the water-soluble amides of alginic acid should be present in the form of carobonamide groups.

The concentration used may vary from at least 0·1%, and preferably 0·2-1% by weight of alginic acid amide, referred to the water present in the preparation.

The addition of the alginic acid amides may take place at any time in the manufacture of the actual ice cream after the alginic acid amide has been dissolved at a recommended temperature in the region of 50-100°C.

Using this method it is no longer necessary for phosphates to be added to the mix.—797,147. *Henkel and Cie, G.m.b.H.*

Biscuit stacking apparatus

This invention relates to an apparatus for stacking biscuits supplied at a high speed in which the biscuits are lying flat in one or more rows on a feed conveyor. A chute leads down from the end of the conveyor to a dead plate which supports the biscuits on edge in stacks, one for each row. There is a device provided for each stack of biscuits which discharges air in a continuous blast pressing the biscuits against the tail end of the stack. A pusher mechanism operates between the tail end of each stack and the lower end of the chute to push the stack or stacks along the dead plate and on to a delivery conveyor.

It is stated that the pusher mechanism may either consist of a single pusher having a reciprocating movement with prongs for engaging a number of stacks or a series of such pushers carried on a chain or chains, the prongs projecting above the dead plate as they move across the clearance space, a fixed cam causing them to retract below the dead plate at the completion of the stroke.—796,969. *Baker Perkins, Ltd.*

Making sausages

Claimed in this patent is a method of making sausages with thin, natural intestine in which there is added to the meat a mixture of 20-30% of Kurrol's salt and 80-70% of sodium and/or ammonium nitrate.

It is stated that the former mentioned product, known as a highly viscous potassium phosphate, has the quality of being only slightly soluble in water, although the salt can be rendered soluble by the presence of other salts containing a cation other than potassium.

It is stated that if a mixture within the range indicated is added to the sausage meat, the sausage meat does not shrink and does not run out of the tied gut. If the sausage meat already contains cooking salt or another salt with a cation other than potassium, the citrate can also be the potassium salt, sodium citrate being formed *in situ*.

In an example given of this process a 5 g. mixture as outlined before is added to 1 kg. of sausage meat after a suitable amount of water or ice has been added. The mixture is then minced in the usual manner.

The finished sausages are stated to exhibit all the essential features of sausages produced with polymer phosphates particularly as far as homogeneity and a smooth cut are concerned.—796,348. *Joh. A. Benckiser G.m.b.H. Chemische Fabrik.*

Shelling hard-kernelled grains

A machine for shelling rice and other hard-kernelled grains, as well as peas, nuts, beans, etc., has, according to the present invention, at least one pair of cylinders which are rotatable about horizontal axes in different directions and at different speeds. Soft and resilient surfaces are thereby presented between each of which there is a nip for the passage of the material to be shelled. The axes of the cylinders are located at an angle of 45° to the horizontal. A swing link carrying the lower cylinder is pivoted to the machine frame to give a rocking movement about an axis parallel to that of the lower cylinder.—797,392. *Lewis C. Grant, Ltd.*

Mechanised cheddaring process

The invention relates to the manufacture of various varieties of cheese, and particularly to that step in the manufacture known as "cheddaring." It aims to provide a comparatively simple apparatus which reproduces mechanically and in a continuous process the cheddaring operation.

The milk from which the cheese is to be made is introduced into vats, ripened and curdled with rennet in the usual way. The sieved curd is then fed on to one end of a conveyor or succession of conveyors. A cutter is so arranged that it will cut the formed layer of curd along its width, with or without cutting it also in the direction of travel, and means are provided for turning the cut slabs so that they proceed along the conveyor. Means may also be provided for piling the slabs one on top of another. A second cutter is provided, with means for again turning the cut slabs and for piling them one on another where this is deemed necessary. This operation may be repeated as often as required, before the slabs pass finally into a curd mill.—797,277. *Independent Dairies, Ltd.*

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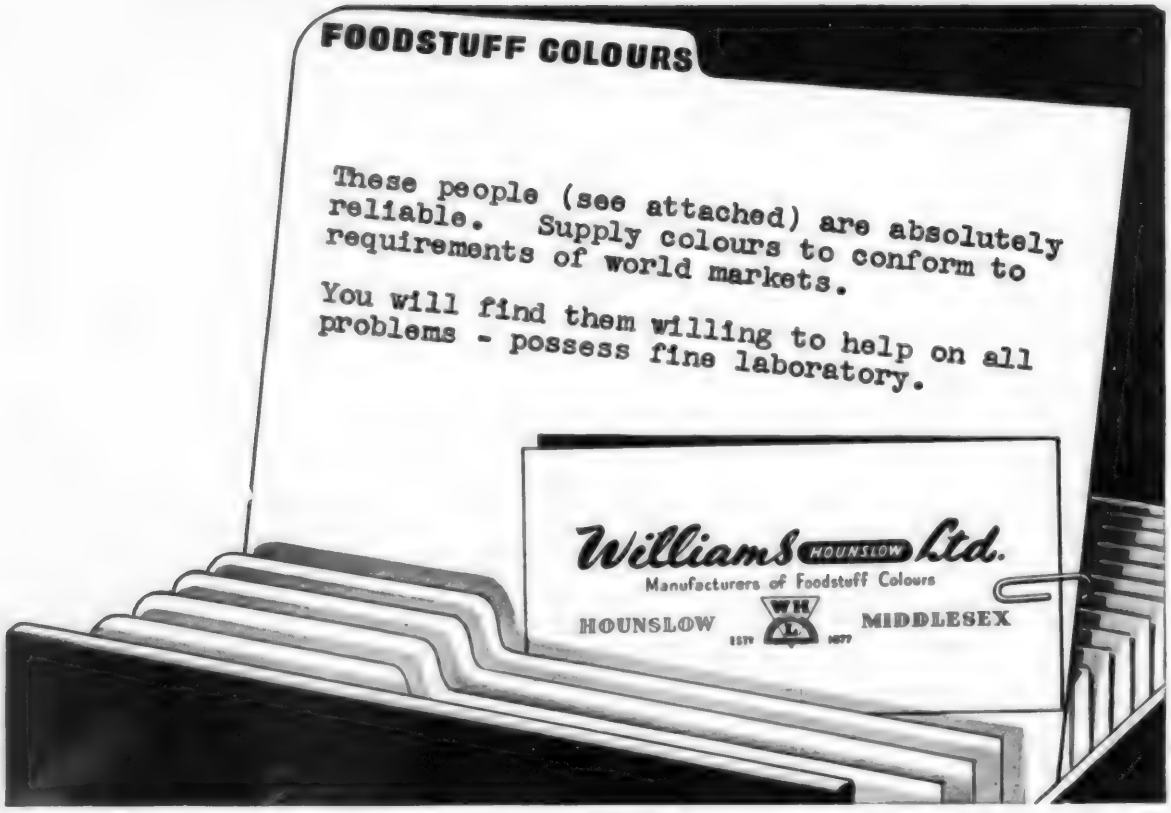
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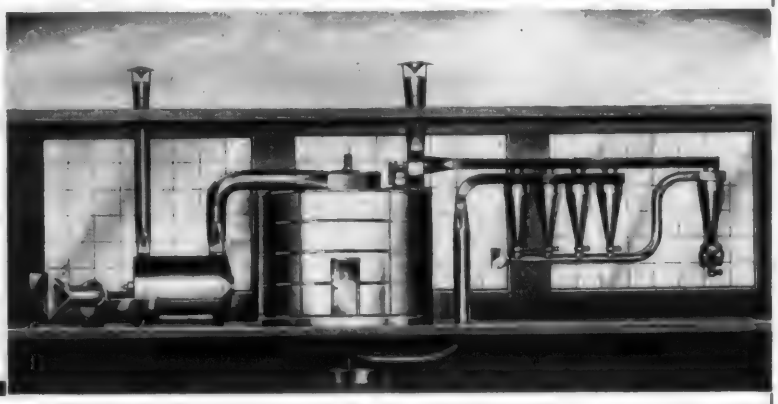

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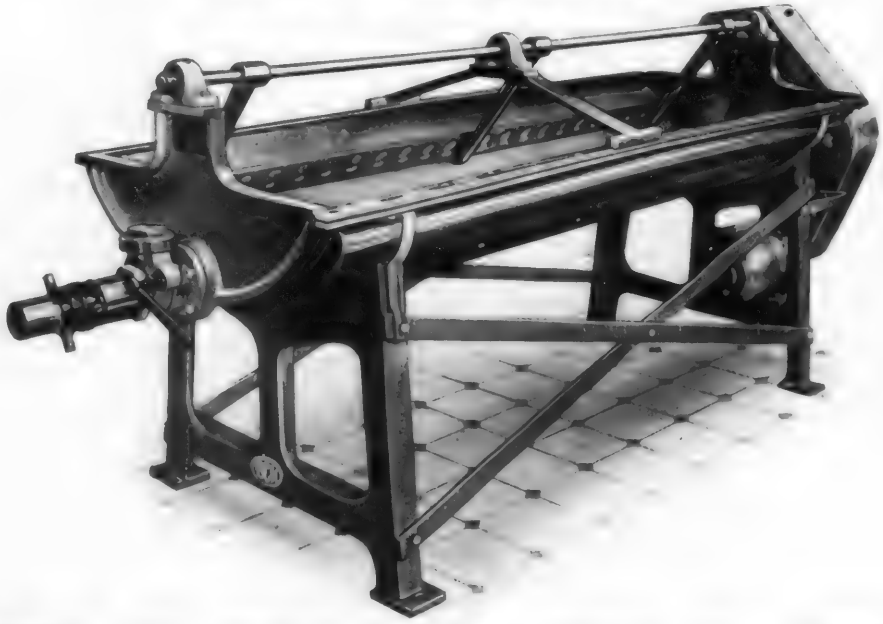

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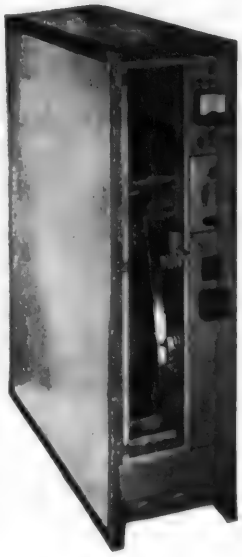

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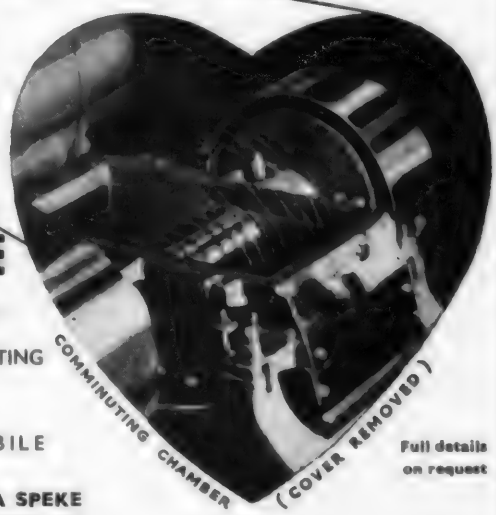

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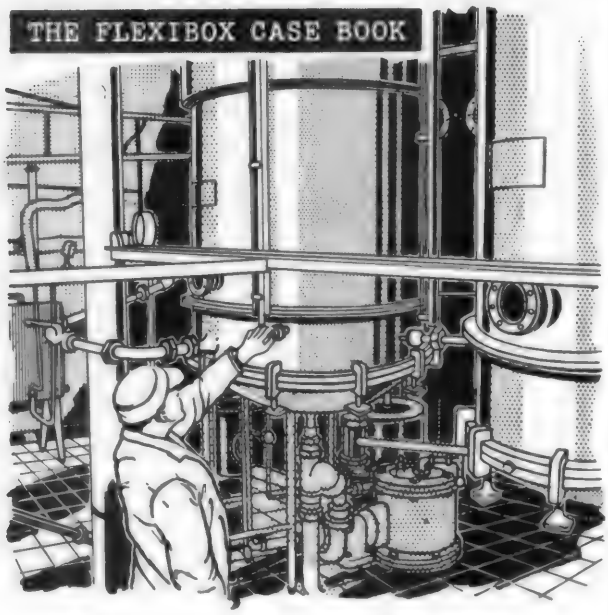

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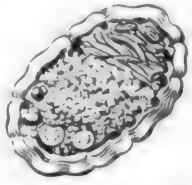

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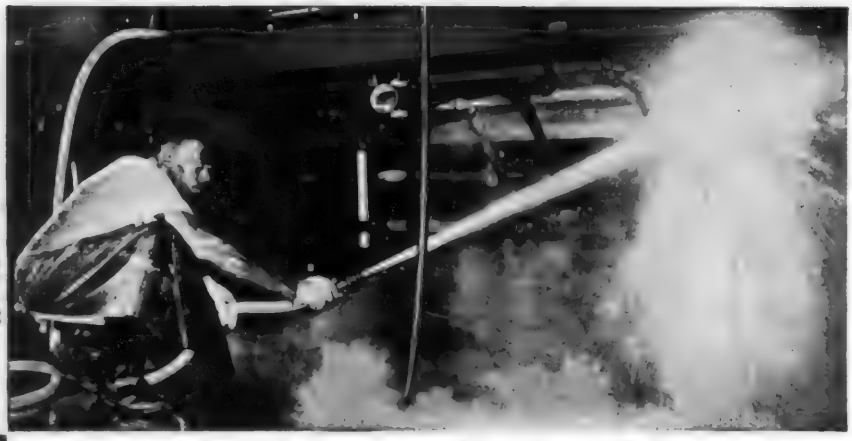

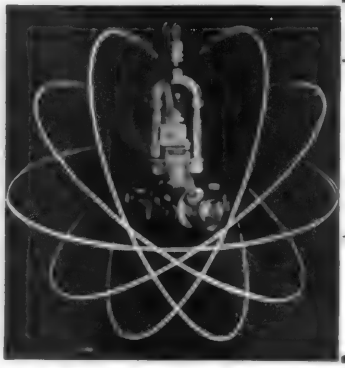

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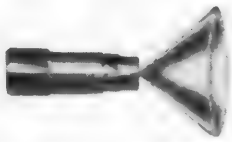

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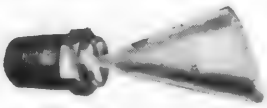

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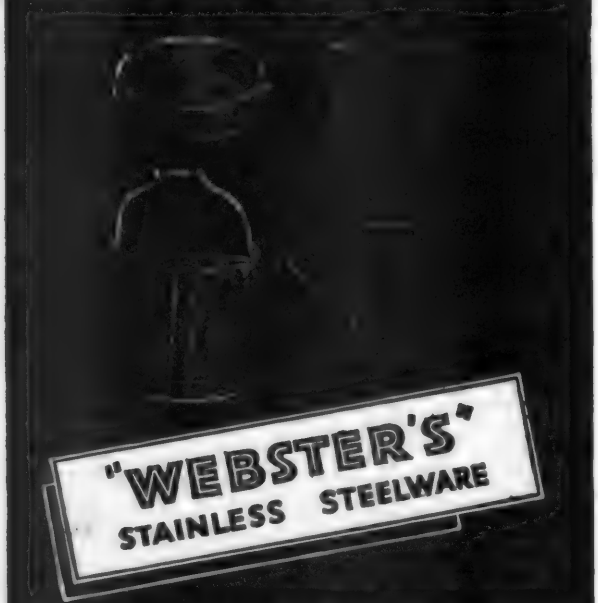

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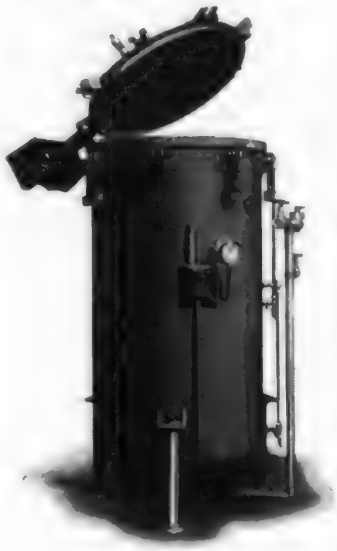

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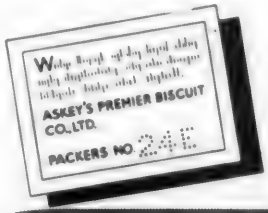

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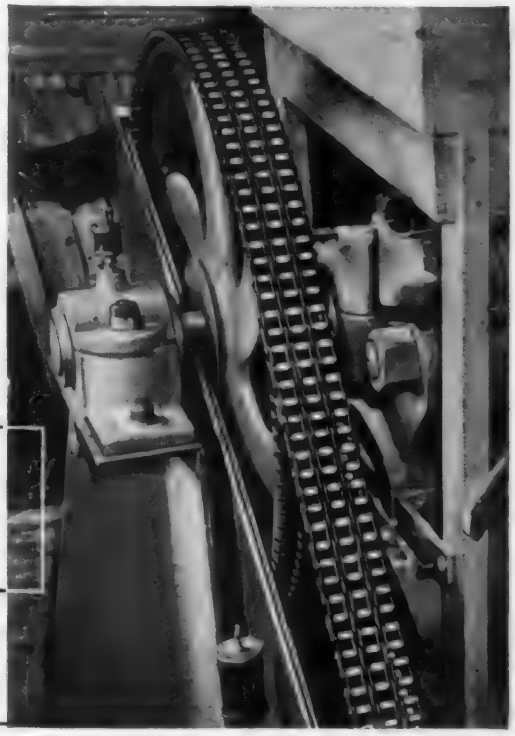

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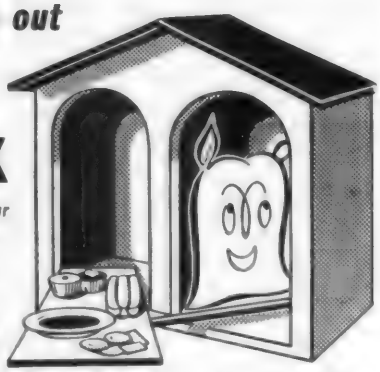

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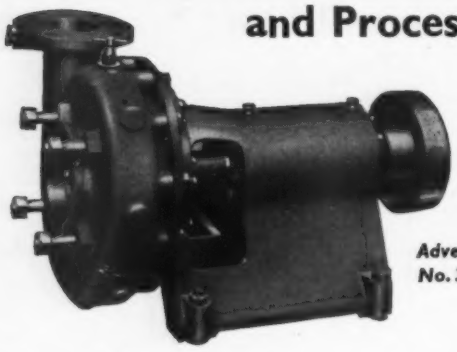

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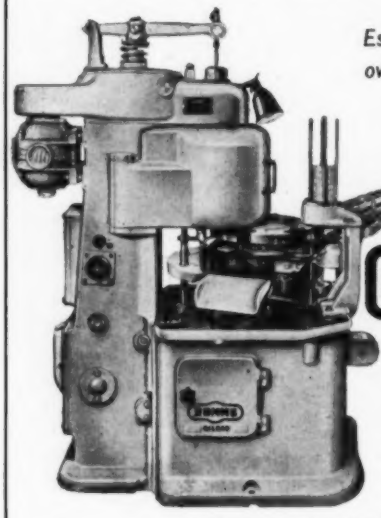

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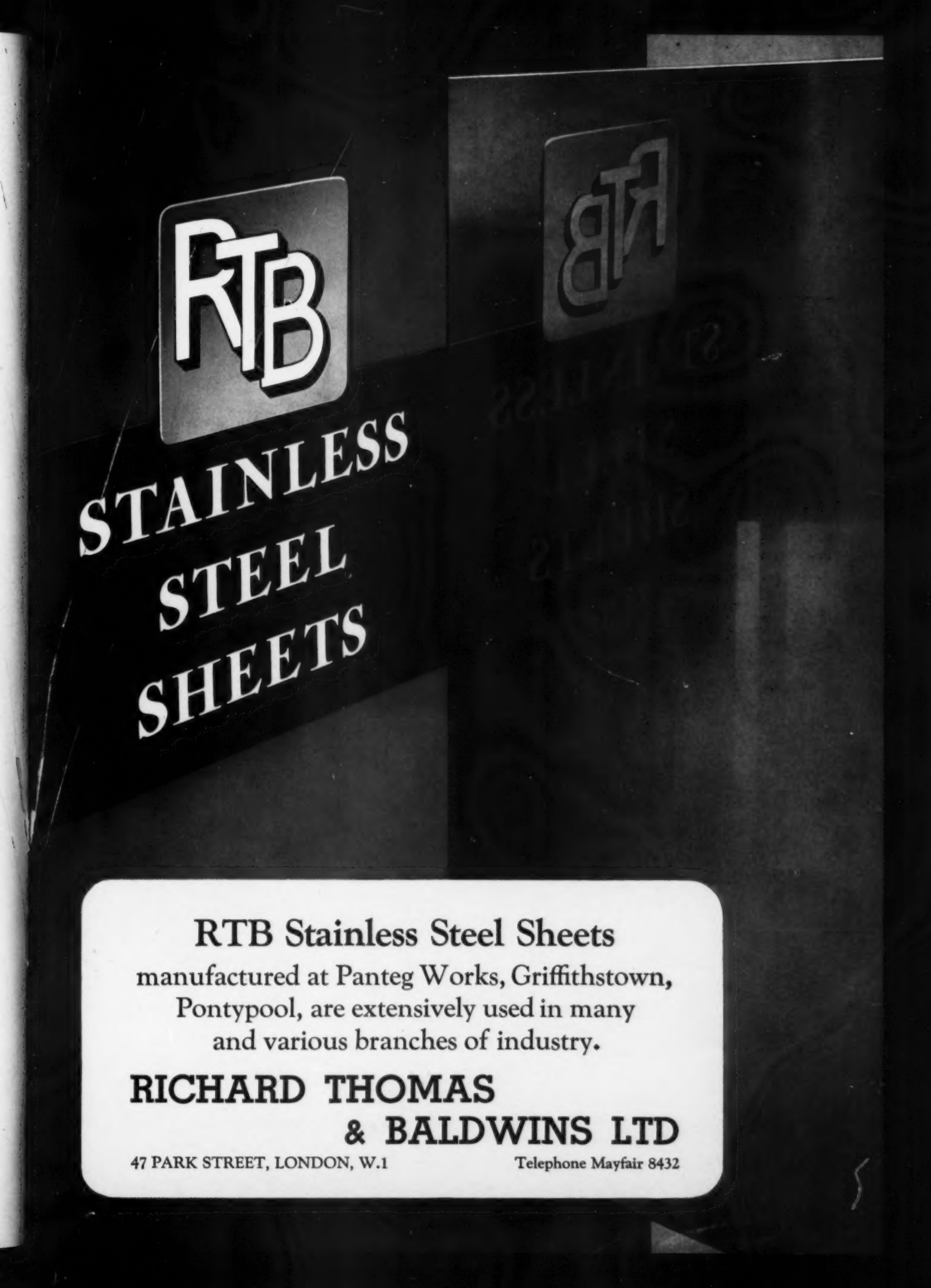

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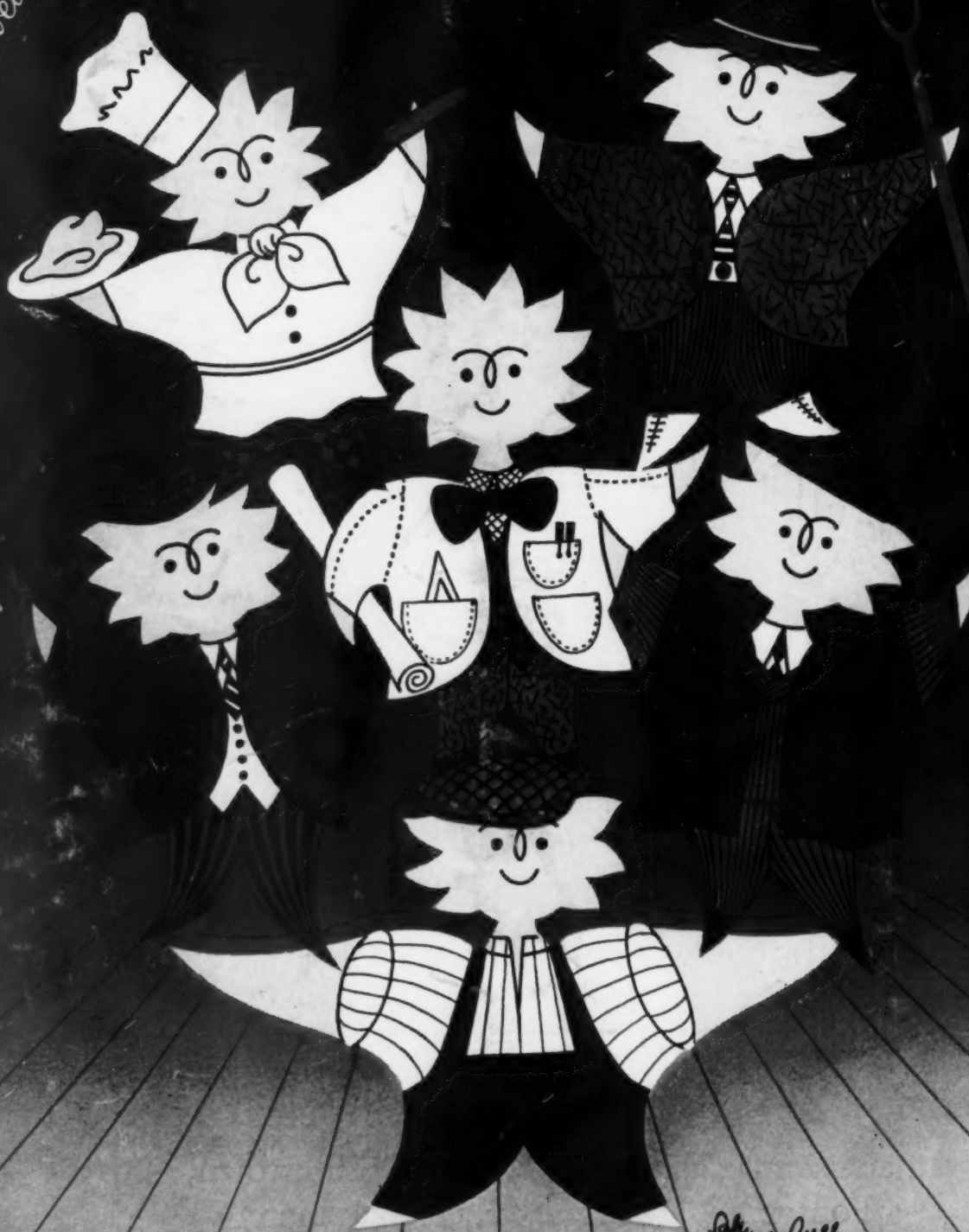

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